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Interpreting Cultural Norms and Practices: a Study of Barthes' Semiology

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Abstract

Language is both verbal and gestural, and as a social being, it is important for us to understand both forms. Often, we find that there are practices which led to misinterpretation of customs and values of society, thus leading to chaos and conflict. We, at times, are chained by the taboo and superstitious beliefs, which often led to malpractices. Thus, a proper and adequate understanding of these social norms and practices become important for the smooth functioning of communication and maintaining relationship in the human society. The paper will examine some of the social practices and cultural norms prevailing in the Bengali Hindu community and understand them in relation to Barthes' theory of semiology.

Keywords: Semiology, Ronald Barthes, cultural norms, Bengali community, social practices.

1. Introduction

The French linguist, Ferdinand de Saussure, popularly known as the father of modern linguistics, had introduced the system of signification. Semioticians and linguists have since then been exploring the concepts of 'sign', 'signifier' and 'signified. Thus, Semiotics or Semiology has not only evolved as a branch under Linguistics but has also been established as a branch of study in itself, owing to its popularity and application in different fields.

One such critic and scholar, Ronald Barthes have advanced his theory of semiology, based on which various cultural and social images can be understood. He, in his theory uses Saussure's

system of signification and structures a second system of signification based on Saussure's, providing a new dimension to thoughts and perspectives.

Thus, the present paper aims to explore the social and cultures norms and practice in one of the well-known and famous communities of Indian sub-continent – the Bengali community. Renowned for its fish-based dishes, Durga puja and world-famous sweets, the Bengali community is spread-out world-wide today. They carry along with them their cultural heritage wherever they breathe and flourish and as such, leave behind an indelible mark.

There are traditional cultural norms and practices that are age-old and are being carried on by the society even today. Some of these have become taboo whereas some are dragged out of pressure, force and compulsion from the senior generations. The present paper will thus examine the significance of some of these traditions found in the Bengali community today and explore their relevance in terms of Barthes' semiological concepts of 'denotative signs' and 'connotative signs'.

The paper will analyse the visual images and signs as found in the Hindu Bengali community across regions and applying Barthes' theory of interpreting 'signs' will provide insights to some aspects of culture and traditions in the existing society.

2. Literature Review

Jadou and Ghabra (2021) in their paper presents a beautiful analysis of the different works of Barthes, highlighting their connection in relation to the interpretation of signs. They also refer to many studies conducted by scholars and have shown how different non-linguistic devices have been used in literature to interpret sign and symbols, providing them with a more convincing interpretation than the linguistic ones. The paper stated that the process of "signification" is concerned with the analysis of both - texts and visual texts.

Thakur, Roy, et al. (2024) in their study have mentioned about numerous findings that revealed the traditional customs in Indian families, particularly those related to the wellbeing of the mother and new-borns. These practices, some of which lack scientific evidence, have been deep ingrained in our social and cultural systems. Their study indicates that the education level in Indian society ranges from being illiterate to that of being a postgraduate. Therefore, the

illiterate women showed a higher tendency to follow and stick to the myths related to child-birth and post-birth compared to the educated women, perhaps owing to a better understanding. According to their reports it also became evident that women themselves have acknowledged that health personnel advise them on child-birth and post-birth issues against these existing myths.

Bhowmik (2019) in her study has reported that the Bengali community is augmented by mythologies and folklores. Bengali people of the north-eastern region are associated with Bangladesh for their origins and practice of various occupations such as fishing, business, etc. The culture and traditions of these people of north-east, thus, represents a fine blend of traditional and fashionable aspects. Right from the festivals up to the principles, the Bengali community of the north-east India have shown a major involvement in these norms and cultural practices.

Garg and Anand (2015) in their paper reflecting on menstruation claims that it is a phenomenon unique to girls and females. However, it has always been surrounded by taboos and myths based on which women are excluded from participating in many socio-cultural occasions. In India, it is a taboo till date in many regions and amongst many communities and that such taboos have negative impacts on girls' and women's emotional state, mentality as well as lifestyle and most importantly, on their health. The challenges in addressing the socio-cultural beliefs related to menstruation is further intensified by the lack of adequate knowledge and understanding of puberty, menstruation, and reproductive health in these women. Thus, they have suggested strategic approaches in combating these issues in the paper with an aim to create a social awareness.

Jacquelyn and Sinha (2023) in their study have focused on the association between menstrual pain, depression, anxiety, and stress among women. Their findings show that there happens to be a substantial negative connection between menstrual pain on one hand and depression, anxiety and stress in women on the other. It was evident that as the level of menstrual pain increased, the level of depression, the level of anxiety, and the level of stress decreased. However, experiencing some level of pain, mood changes, and stress during menstruation is normal and that these can significantly help women feel reassured. Many women also undergo

certain physical and emotional symptoms during their menstrual cycle, and that being aware of this connection can actually lessen alarms about abnormality and/or basic health issues.

Gaurav and Parbat (2024) in their paper examines '*The Palace of Illusions'* which is a re-telling of the famous Indian Epic, Mahabharata, from its lead female character named Draupadi (also named 'Panchali'). The study states that today's women are well-equipped and capable of handling their physical needs but in the ancient days they did not have good sanitary facilities. To add to that in those days women had to undergo numerous physical activities. Therefore, a woman who was going through her menstrual cycle could get a break from everything for those three days in a month. That was the time when others cooked and aided her. It would be the days when she could attend to her emotional needs and therefore is seen as a good way of protecting women. However, the study reports that out of sheer ignorance, people made this a prejudiced practice.

Future generations are born owing to the process of menstruation and if this process is considered to be impure, the very birth of next generation must also be termed as impure and hence, the process of creation itself would be impure (Gaurav and Parbat, 2024). Women were given rest during those days of her cycle but the society manipulated the healthy practice and started treating the women with disdain. Hence, the paper emphasises that Hindu mythology does not talk about women being impure but the patriarchal society in India had altered a boon into a bane for the women. The paper exerts that it is rather painful to see that the notions of the pre-Vedic era have undergone such tremendous changes degrading the values of the society.

3. Barthes' Semiology

Semiotics is known to be the study of both the linguistic or verbal signs as well as the non-linguistic or non-verbal gestural or signs. We know that Barthes' semiotic theory is based on two aspects – the first being the 'explanation of myth' and the second being Saussure's concept of signification. Saussure's concept stated that 'signifier' and 'signified' are the two levels of understanding 'signs' and that in the absence of one, the other loses its importance. Thus, both - 'the signifier' and the 'signified' are important to understand the meaning of 'sign'. So, according to Saussure, 'sign' has two levels – one is 'signifier' and the other is 'signified'.

But Barthes views it differently stating that ‘sign’ is not the beginning of one’s understanding the concept but infact, ‘sign’ is the very outcome of the relationship established between the two entities of ‘signifier’ and ‘signified. That is to say, they work together in an inseparable bond to give rise to a unified sign.

Barthes, in connection to this, stated that the signified entity which is the direct image of the object – whether concrete or abstract - gives rise to a denotative meaning of the object spoken about or referred to. Thus, denotative meaning is the literal meaning of the ‘sign’ or the ‘word’. This he referred to as the “first order system” (Barthes, 1968).

To this, Barthes applied myth to construct a “second order system” in which the so-formed ‘sign’ of the first order system becomes the signifier of another ‘sign’ - a word or image. This triggers the interpretation or widening of the original meaning of the first-order system. Thus, this leads to the expansion of the original sense and widens the mental concept of the said first-order ‘sign’. This gives rise to different associated meanings of the said ‘sign’ and these meanings are what Barthes refers to as the connotative meaning. Thus, connotative meaning is related to the mental concepts.

Thus, Barthes can be credited with the honour of restructuring the field of semiotics from that of linguistics to visual images. Barthes illustrated that historical aspects and various cultural dimensions impact on the interpretation of a said ‘sign’. This leads to multiple meanings of the said ‘sign and thus enriches our visions and relations with the world around. Thus, using Barthes’ theory of semiology one can study the ways in which myths and beliefs in our society and culture are generated.

In fact, it is Barthes’ theory that brings in the extension of semiological signifieds (Jadou and Ghabra, 2021), referring to the function of a whole system serving communication and interaction in the human society. May it be the cultural norms, the superstitions, the taboo, the myths, the believes, the social customs – all of these are based on the relationship between the denotative meaning of the signified of the first-order system and the connotative meaning of the signified of the second-order system.

Thus, in terms of Barthes' theory of semiology one can say that signification is the process of linking the 'signifier' to the 'signified' to produce a meaning sign, which can have multiple layers of references.

4. Moving Ahead from 'Denotative' to 'Connotative'

The rich tradition and culture of the Bengali community in the Indian context is well-known to the world. There are cultural connotations which are visible at a wider scale in the Bengali community that is spread across the globe. Some of these cultural connotations have turned into hard-wired superstitions whereas some others are gradually fading away owing to increase in women literacy rates as pointed out by Bhowmik (2019).

4.1 Blowing of 'shankha' and ringing of 'ghanta'

One such interesting traditional practice in the Bengali community is the blowing of 'shankha' and ringing of 'ghanta' or bell when performing 'puja' or prayers. May it be in case of 'nitya puja' or 'barshik puja' or daily prayer, it's a common practice for the community to blow 'shankha' at the end of the puja to symbolise the culmination of the prayer service. Similarly, the 'ghanta' is continuously rung with the left-hand during the puja as an accompaniment for the other rituals. The main purpose of using these two entities during the prayer service is likely to spread out the message to the locals of the area that one is performing the puja at one's residence.

Similarly, it is believed that the idol of Lord Narayan must be present when a priest performs special pujas. Therefore, it's a usual practice that when the priest enters one's house for performing a special puja, he enters the house with the idol of 'narayan' (a form of lord Krishna) in his lap. Thus, to spread out the information to others in the neighbourhood that the 'puja' or the prayer service is about to begin and that the priest has already arrived, the owners of the house blow the 'shankha'. Thus, the sound of the 'shankha' symbolises a welcoming of the neighbours to join the concerned family for the special ceremony.

We might interpret this as a symbol to create an awareness amongst the neighbours about the significance of the event or that of the moment in one's house. Thus, examining in Barthes' terms, the 'sounds' of 'shankha' and 'ghanta' is the 'sign' of the first-order system as well as acts as the 'signifier' of the second-order system, bearing the signified meaning of 'coming

together to celebrate the event or the occasion'. This is the connotative meaning of the sounds of these two instruments.

However, there is a visible practice of blowing of 'shankha' and ringing of 'ghanta' during emergencies, especially during earthquakes or when fire breaks out. It is seen that during earthquakes, irrespective of time – day or night – people start blowing 'shankha' and ring 'ghanta'. It begins with those households where people realise the beginnings of the earthquakes and slowly all the other neighbouring houses and families gradually join in the same. The reasons as to why people blow 'shankha' and ring 'ghanta' is because they want to alert other houses in the neighbourhood and create an awareness in the neighnouring families about the earthquake, so that people can adhere to safety measures and safeguard themselves from dangers.

Thus, what we see is that the 'sounds' of these two instruments co-relate and establish a relationship further with 'creating an awareness and passing over the message of probable danger' to the community. Since the sounds from these two instruments are loud enough, it is sufficient to reach a larger area so that people can realise the earthquake and take measures to safeguard themselves and their families. Thus, this is a collective effort put by the community for a social concern and a good cause.

This is clear evidence that the connotative meaning of 'coming together to celebrate the event or the occasion' has now been further extended over or applied to connotatively also mean 'creating an awareness to take precautionary measures'. Thus, whenever people use these instruments, especially blow 'shankha' at odd hours of the day, the neighbours are alert with regards to any probable threat that the concerned family or the locality might be prone to. Thus, the usage of these instruments is not restricted to 'puja' or prayer service alone but has been extended to a wider domain that of 'passing the information or message of a social concern' or 'creating an awareness' in the immediate locality or neighbourhood.

4.2 Reservations for the Mothers and Their New-borns

Thakur, Roy, et al. (2024) in their paper refer to the traditional practices in India during pregnancy, childbirth and newborn care, where they have talked about many myths and superstitions that are prevailing in the society and their effects. With reference to these, one

age-old one-month long practice is to keep the mother and her new-born in a room, popularly known as ‘aatur ghor’, which must not be accessible to the rest of the family for their needs. According to the practice, the mother and the infant are prohibited from stepping out of the room – ‘aatur ghor’ - and nobody, except the nurse or the attendant, is permitted to enter the room.

In case an individual (a relative or a well-wisher) intends to visit or is willingly to meet the mother or the new-born, he/she will have to compulsorily take a head-bath and clean oneself off immediately after having stepped out from the specified room. Only after which that individual gets accepted in the family/ society and can continue his/her normal chores, else not. Thus, the common general existing practice makes the specified room – the ‘aatur ghor’ - look like a confinement cell from which the mother and the new-born has no break or escape for a long period of one month and above all, the mother and the new-born are treated as ‘untouchables’.

In the existing practice, food for the mother is served in utensils and kept at the boundaries of the so-called confinement cell or room and then either the mother herself or the attendant takes the food into the room, where it must be consumed.

This is a practice that is stricter and sterner in the villages; in the lower strata of the society while in the educated class today it is easing out with certain liberties.

Examining from the scientific point of view, after childbirth, the mother and the new-borns must be kept safe in a clean hygienic room to ensure that both the mother and the infant are protected from infections, as both are then susceptible to infections at that stage. So, to ensure their health, it is advisable to keep them in a room which is not accessible to the other members of the family for their daily needs. Our ancestors, in the past, must have introduced this practice of segregation of the mother and the new-born owing to these reasons of safety and protection, so that they could be kept away from harmful infections, which the locals and/or family members would be carrying but were unaware of them. This was indeed a justified practice that must have been introduced in our culture in the ancient days.

But quite on the contrary, it has today become a stigma and that the mother and the child, both are treated as untouchables and so nobody goes near to them or enters the room they are kept locked up and if an individual comes in physical contact with them even by mistake, then the persons / individuals are forced to take a head bath, cleaning themselves appropriately to be accepted back in the family(/society). Contrary to the need of ensuring the safety and health of the child, which happens to the root cause of keeping the two separated from others, the society today believes that the mother and the child are 'impure' and so anybody who would come in physical contact with them, would also lose one's purity. The communities have thus, reversed the meaning of the hygienic practice in the long run and have substituted the symbols of 'hygiene and protection' with that of 'impurity' and hence, at large, have ended up with these superstitious believes and norms.

Thus, 'aatur ghor' is the 'sign' of the first-order system according to Barthes' theory of Semiology and the image of the real room is the signified object – the denotative meaning. So, in the second-order system, if the 'aatur ghor' is the 'signifier', then it triggers the sense of 'impurity' as the connotative meaning today, instead of meaning 'hygiene and protection' – its original sense. Thus we examine a shift in the connotative reference with the passage of time and misinterpretation of the needful. This is thus, evidential for how the denotative meaning of hygienic symbols are extended over to a wider domain, though negatively, to stand for 'impurity'.

Similarly, in Barthian terms if we consider the 'sign' of the first-order or the 'signifier' of the second-order system to be the 'practice of having a separate room or space for the mother and the child', denotatively it meant 'protection and safety of the two'. But owing to superstitions and misinterpretation of the good practice, today the 'protection and safety measures' have attained a new meaning, that of 'impurity', hence, the connotative meaning of the said healthy practice.

4.3 Prohibitions during Menstruation

Similarly, there happens to be another such social practice which is a turned taboo today in certain communities and cultures alike certain segmented pockets in the Bengali community. In certain regions of Indian sub-continent, the five to six days of menstruation is considered

auspicious and females are worshipped during those days. However, there exists pocketed families, across regions, where these five-six days of menstruation is a taboo.

As mentioned by Garg and Anand (2015), as part of the education, girls in general in certain religions are instructed and taught since childhood not to perform puja or any rituals related to prayer during the menstruation days. As such, females can neither enter the prayer room nor temples nor take part in any puja related rituals on those days, when they are undergoing their menstruation. However, there are practices across regions where the communities/families restrict the menstruating women from entering the kitchen or from doing household chores on those days of her menstruation.

To add to this practice, there are families where menstruating married women are prohibited to sleep on beds[1] (or on the same bed) with their families and also are not permitted to apply 'sindoor'[2] or vermillion on their foreheads on those days of menstruation, considering that during menstruation women are 'impure'. Thus, today these beliefs are stigmatised and so menstruating women are held in disrespect on those days of the month.

We get references of these practices even in *Mahabharata*, the great Indian epic, Sabha Parva (the famous dice episode) where Draupadi was forcefully brought before the court of the king by Duhsasana, when Yudhisthir lost Draupadi in the game of dice to Duryodhana. When Draupadi was summoned to be present before the court, she refused on grounds that as she was menstruating, it was not possible for her to be present before her elders (Gaurav and Parbat, 2024).

Another evidence of this practice is highlighted in the Bollywood movie named "*Padman*" released in 2018, written and directed by R. Balakrishnan, where two such incidents are projected. A married woman in one case and in the other a young girl, who undergoes her first experience of menstruation, are shown forced to abide by the social norms of menstruation anonymously agreed upon by the village community and hence these two women are made to follow the said practices.

[1] In some families, they sleep separately on mats
[2] Sindoor or vermillion is applied by married Hindu females as a symbol of their marriage.

Though this seems to have been an age-old practice, this might have been a healthy one so that the menstruating women could take rest and take better care of her health (Jacquelyn and Sinha, 2023), which is essential owing to the loss of blood from her body. Owing to lack of sufficient evidence, though Garg and Anand (2015) in their paper refer to some, the ancient reasons cannot be justified today but this practice based on humanity grounds, based on medical reasons and one's encyclopaedic knowledge can be considered healthy as it symbolises 'taking rest and care of the menstruating women' so that she recovers the loss from her body and can overcome the menstrual pain and bloating.

However, it is negatively portrayed today in certain pockets of the present society where the menstruating female is considered 'impure' and so she is abstained from kitchen and other household chores. In some communities today it is observed that the said restrictions are reduced to one to two days or to two to three days on women.

Thus, a good practice, owing to misjudgement and misinterpretation has turned out to be a stigma in a small number of families in certain parts of these communities. Owing to literacy and spread of education, women have been liberated from this taboo to a noticeable extent but not completely even today.

Thus, if we consider 'menstruation' to be the Saussurian sign, in these pocketed communities, the word signify 'restrictions'. Thus, when the Saussurian 'sign' acts as the Barthian 'signifier' of the second-order system, the word 'menstruation' thus should have referred to 'restrictions with regards to taking good care of the woman's health, ensuring sufficient rest for her and maintaining hygiene'. But, the misinterpretation of this healthy practice has led to the widening of the concept of these 'restrictions' but in a negative sense. So today the pocketed sections of the communities associate 'restrictions' during menstruation with the connotative meaning of "separating the menstruating female from the entire family, from performing household chores, prohibiting her from coming in physical contact with anybody in the family (society), prohibiting her from touching any physical object in the house". Therefore, confining her within a restricted place or a room in the house.

Thus, the connotative meaning is the one that is based on misinterpretation of the good healthy practice leading to superstitious beliefs and norms in the present society. Thus, in terms of Barthes' semiology the second-order 'signifier' concept has brought in significant challenges for the women and has led to setting up of a taboo in the so-called modern developing progressive communities.

4.4 Wearing of 'shankha' and 'pola' Bangles

The two bangles – 'shankha' and 'pola' – are an integral part of the Bengali community world-wide. The 'shankha' is the bangle that is white in colour and is made up of conch shell whereas the 'pola' is red in colour, crafted from red coral.

It is believed that in the ancient days wearing 'shankha' and 'pola' were the customs of the poor married fisherwomen, who owing to dearth of money could not afford to buy ivory or iron jewellery (Himaghna, 2025). So, they made ornaments out of the corals and conch shells that were easily available from the seas and sea-shores. Similarly, archaeological evidences proposes that conch shells were basic to local communities as they made tools, ornaments and other objects of worship too out of these.

So, in the ancient days in the community of the fishermen, these 'bangles' were a 'sign' that the woman wearing them is 'married'. But it was worn, not out of force or compulsion but because these fisher women wanted to look different from the unmarried girls of their community. So, any woman with these red and white bangles on their wrists denotatively meant that 'she was married'. So, these bangles came to signify 'marriage'. Interpreting this trend in the terms of Barthes, we can say that these 'red and white bangles' acted as a sign, the denotative signified sense of which became 'married'.

However, with the passage of time, the Brahmanic tradition fused with local customs, making the 'shankha' and 'pola' bangles an indispensable part of Bengali Hindu identity. This was a custom similar to the use of 'sindoor' or vermillion on the foreheads by the married women. On one hand where 'shankha' stands for purity, calmness and devotion to the marriage relationship, 'pola' stands for fertility, passion and blessing. Similarly, while 'shankha' means a bride's commitment to her responsibilities in the new family as well as the purity of her heart,

on the other hand, wearing a 'pola' signifies bride's inclination to embrace her new-fangled role as a companion.

Thus, while in the ancient days in the fishermen's community, 'red and white bangles' connotatively signified that the woman was 'married', later on the meaning of the 'red and white bangles' got widened with the passage of time and thus became a compulsion for every married woman across the Bengali community to wear them. Thus, the same 'red and white bangles' in the long run though retained its original sense of 'being married', attained a wider reason for its becoming a 'mandatory ornament' during the marriage rituals and even post-wedding in the Hindu Bengali community, irrespective of caste and social strata.

Interpreting in Barthian terms, the connotative interpretation of these 'red and white bangles' – the second-order 'sign' - today invariably symbolize her being married and that the woman approves of her willingness to support her marriage by extending support and hence, balance the marriage. The clingy sound of these red and white bangles is believed to bring good fortune and bliss to the couple. It also signifies eternal love and a harmonious gratifying matrimonial relationship. Thus, there are communities, where wearing these bangles on both the wrists symbolize woman's marital status and also her associations with her cultural heritage.

Some four to five decades ago, it was more of a compulsion for every married woman to wear them irrespective of their social strata. However, today, women enjoy considerable liberties in wearing them. In fact, females use them as per the trends of wearing them in their immediate society. In some regions they are worn out of fashion either on both hands or only on one hand and are also adorned with gold designs at times. However, in today's generation, opting to wear 'shankha' and 'pola' also reveals a married woman's emotional state of being in her relationship.

5. Conclusion

Thus, the paper provides explanations and interpretation to some of the prevailing customs and practices in the Bengali Hindu society of today and tried to focus on the reasons as to why there are conflicting tendencies in the community. Myths, taboo, beliefs, norms, practices, superstitions have been part and parcel of every society, with a difference that some are overloaded while others enjoy liberties. But it is important and also interesting to understand

the reasons that guide them and fore-front them. As such, this paper made attempted to examine some of the eminent social practices and cultural norms prevailing in the Bengali Hindu community interpreting them along the lines of Barthes' theory of semiology.

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Comparative Study of Adverbial Clauses in Lai, Mizo and Mara: A Syntactic Analysis

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Abstract

Subordinate clauses that alter their super-ordinate clauses are known as adverbial clauses (Sæbø, 2011). In this study we will examine on the intricate construction of adverbial clause in three Tibeto-Burman languages spoken in and around the state of Mizoram, India namely Lai, Mizo and Mara. Adverbial clauses are identified by adverbial subordinators, which indicate a specific semantic connection between the main and adverbial clauses (Diessel 2001). Likewise in these languages, adverbial clauses are constructed with the help of the lexical adverbial subordinators. These adverbial particles help in labelling and categorizing the adverbial clause with respect to the semantic roles they play.

As mentioned, the semantic content of the constituent to which the participle is linked typically determines the type of adverbial sentence that is generated, including conditional, temporal, causal, manner, purpose, substitutive, and additive clauses. These adverbial clauses are examined in detailed in this study. In several languages, the position of adverbial subordinate clauses is one of its characteristics (Thompson, Longacre, & Hwang, 1985). Lai, Mizo and Mara are also classified as a non-rigid ADV-S/SVP language according to Diessel's (2001) classification as its adverbial clauses usually come before the main clause or predicate, however they can also commonly appear at the end of a sentence. However, this does not affect the grammaticality of the sentence. Furthermore, the embedded predicates are in Stem II form

in Lai and Mizo but not in Mara for adverbial clause while this is not the case for its relative clause where the embedded predicates are always in the form of Stem I.

Keyword: Mizo, Mara, Lai, Adverbial Clause, Subordinate Clause, Tibeto-Burman

1. Introduction

Lai, Mizo and Mara are Tibeto-Burman languages spoken in neighbouring (and overlapping) areas of Chin State, Myanmar and Mizoram State, India. These three language speakers contribute to the majority of the population in Mizoram, with Mizo being the official language along with English, and Lai and Mara having their own autonomous administration in the south. As a Tibeto-Burman language they are tonal, meaning that variations in pitch can change the meaning of a word. Nominalization is a prominent feature, where verbs are converted into noun-like forms, often used to create complex clauses even for adverbial clause. However, in these languages they required the presence of an adverbial subordinator and cannot be constructed without additional conjunctions. While flexibility exists, many Lai, Mizo and Mara tend to follow a Subject-Object-Verb (SOV) word order. They share lexical similarities on a core set of vocabulary, especially in basic domains like kinship terms, numbers, and nature. Highlighting the fundamental linguistic properties of these languages shows how these features unify these three Tibeto-Burman languages, however each language also possesses unique traits that reflect its cultural and geographical heritage. A syntactic comparation in an adverbial clause is used here to compare two actions or events, typically marked by conjunctions, temporal connectors, etc. which allow for a nuanced comparison of events within a sentence, highlighting differences in manner, degree, or time. Data were collected from two native speakers of each language, ranging in age from 25 to 65. Informants come from a variety of backgrounds, including master's students and teacher pensioners.

2. Characteristics of Adverbial Clause

According to Thompson, Longacre and Hwang (1985), adverbial clauses are adjuncts that serve as adverbial or ad-sentential modifiers. Adverbial clauses can always be eliminated because adjuncts are optional. Additionally, adverbial subordinators, which denote a particular semantic link between the main and adverbial clauses, mark adverbial clauses (Diessel 2001). Likewise, in these languages, adverbial clauses are constructed with the help of the lexical

adverbial subordinators. As a Tibeto-Burman language, Lai, Mizo and Mara has an SOV word order and they are head-final languages where the modifiers follow the modified. Therefore, they are also classified as a non-rigid ADV-S/SVP language according to Diessel's (2001) classification because its adverbial clauses usually come before the main clause or predicate (example 1), however they can also commonly appear at the end of a sentence, hence non-rigid. The lexical adverbial subordinators follow the adverbial clause even when it comes after the main clause. This does not affect the grammaticality of the sentence or bring changes in the gender, tense or number. In several languages, the position of adverbial subordinate clauses is one of its characteristics.

1. *a) ka feʔ tʰeiʔ tsun ka lo sim diŋ (Lai)*
   1Sg go can COND 1Sg hither tell MOD
   'If I can go, I will let you know'
   b) ka kal tʰeiʔ tʃuan ka lo hrilh aŋ tʃe (Mizo)
   1Sg go can COND 1Sg hither tell MOD 2ACC
   'If I can go, I will let you know'
   c) *eɪ vɔ tʰei kʰia-ta-la eɪ tɛa vɔ tɛʰo kʰɔ (Mara)*
   1Sg go can COND 1Sg 2Sg hither tell MOD
   'If I can go, I will let you know'

Adverbial clause can be either finite or non-finite. Example (2) shows a finite main clause that comes with a finite subordinate clause. We can also have adverbial construction which consist of both the finite and non-finite either as a main clause or subordinate clause. In example (3) the subordinate clause contains a non-finite verb that does not indicate tense and functions as a present participle, while the main clause has finite-verb which shows that the structure of the sentence is in the past tense and agrees with the subject.

2. *a) ka fatetlai kʰan ka tʰiamtʰei (Lai)*
   1Sg child when 1Sg studious
   'I was studious when I was small'
   b) ka tetlai kʰan ka tʰiamtʰei (Mizo)
   1Sg child when 1Sg studious
   'I was studious when I was small'

c) *eɪ tatɔno kʰɔ ei tʰai tʰei (Mara)*
1Sg child when 1Sg studious
'I was studious when I was small'

3. a) *a ron ziʔ ruaŋaʔ ka rak tluŋ (Lai)*
3Sg hither come since 1Sg go home NEG
'Since he/she is coming, I did not go home yet'
b) *a lo kal dɔn avaŋin ka la hɔ lo (Mizo)*
3Sg hither come MOD since 1Sg OPT go home NEG
'Since he/she is coming, I did not go home yet'
c) *avø ɔpa ʰnaita a-di maʔ va-na (Mara)*
come MOD since 1Sg-to go go home NEG-2Sg
'Since (s/he) is coming, I did not go home yet'

Some languages have the same morpheme that can be used for both coordination and subordination. These three languages also show the same. The adverbial subordinator *tsun*/*tʃuan* can be used not only for subordination but also for coordination. When it is used in coordinate clauses it usually has a fixed place in reference to the other conjunct, however the position in adverbial clauses can vary. Example (4) shows the adverbial clause in the initial position accentuating on the main clause, while example (5) shows it following the main clause which puts emphasis on the subordinate clause. Example (6) shows that when the adverbial subordinators precede the adverbial clause it leads to ungrammaticality of the construction.

4. a) *a in-tʰɔn ʰlanaʔ tsun saza a si tʰeu (Lai)*
3Sg RCP- move before COND teacher 3Sg COP HAB
'Before he/she moved, he/she used to be a teacher'
b) *a in-sɔn ʰma tʃuan zirtirtu a ni trʰin (Mizo)*
3Sg RCP-move before COND teacher 3Sg COP HAB
'Before he/she moved, he/she used to be a teacher'
c) *a pasie ʰlata tɛa patɛutuʔ a tɛa tyʔ (Mara)*
3Sg move before COND teacher 3Sg COP HAB
'Before he/she moved, he/she used to be a teacher'

5. *a) saza a si tʰeu tsun a intʰɔn (Lai)*

teacher 3Sg COP HAB COND 3Sg move

'He/she was a teacher before and then he/she moved'

b) zirtirtu a ni trʰin ʧuan a insɔn (Mizo)

teacher 3Sg COP HAB COND 3Sg move

'He/she was a teacher before and then he/she moved'

c) *patɛutuʔ tɛa tyʔta tɛa-hra-sa-la a pasie hɔ (Mara)*

teacher COP HAB COND 3Sg move MOD

'He/she was a teacher before and then he/she moved'

6. *a) *tsun a intʰɔn saza a si tʰeu (Lai)*

COND 3Sg move teacher 3Sg COP HAB

'And he/she moved he/she used to be a teacher'

*b)*tʃuan a insɔn zirtirtu a ni trʰin (Mizo)*

COND 3Sg move teacher 3Sg COP HAB

'And he/she moved he/she used to be a teacher'

c)**tɛa-hra-sa-la a pasie hɔ patɛutuʔ tɛa tyʔta (Mara)*

COND 3Sg move MOD teacher COP HAB

'And he/she moved he/she used to be a teacher'

Lai, Mizo and Mara have two types of subordinating morphemes- grammatical morphemes with no lexical meaning such as the suffix *-la* and grammatical morphemes with lexical content. They will be further explained with examples in the following section.

The embedded predicates are in Stem II form in Mizo and Lai for adverbial clause while this is not the case for its relative clause where the embedded predicates are always in the form of Stem I. Mara uses Stem I form of the verb even for adverbial clause (example 7-c and 8-c). More than one adverbial subordinator can be utilised in one sentence structure (example 7).

7. a) a rɔn tʰeiʔ lauʔ natsantsu a buai tuk a si (Lai)

3Sg come can NEG because 3Sg busy INT 3Sg COP

'He/she could not come because he/she was busy'

b) a lo kal tʰeiʔ loʔ natʃʰantʃu a buai lutuk avaŋin (Mizo)

3Sg hither come can NEG because 3Sg busy INT since

'He/she could not come because he/she was busy'

c) *a vø tʰei-lei na-tɕʰa-la a bua tu ʰnai ta (Mara)*

3Sg come can-NEG because 3Sg busy INT since

'He/she could not come because he/she was busy'

8. a) *ʰna kan tʰeʔ vur vau tʰeiʔ naʔaʔ ka feʔ tuan (Lai)*

job 1Pl finish early so that 1Pl go early

'We went early so that we can finish the job/work early'

b) *ʰna kan zɔʔ ʰma tʰeiʔnan kan kal ʰma (Mizo)*

job 1Pl finish early so that 1Pl go early

'We went early so that we can finish the job/work early'

c) *rai eima patlo pato tʰei-nɔpa-ta eima vɔ pato (Mara)*

job 1Pl finish early so that 1Pl go early

'We went early so that we can finish the job/work early'

3. Types of Adverbial Clause

The kind of adverbial clause – condition, temporal, causal, manner, purpose, substitutive and additive - that is created usually depends on the semantic content of the constituent to which the participle is linked.

a. Conditional Adverbial Clauses

Conditional adverbial clauses specify a prerequisite for the occurrence of the event indicated in the main clause (Diessel, 2001). Conditionals with a present tense can utilise the conditional *tsun, ʧuan, kʰia-ta-la* and *pa-tɕa*. They can also be seen in clause that reflect the likelihood of an event happening in the future. However, phrases having an event that has already occurred and have a counterfactual meaning are employed with the other conditional subordinates.

9. a) *na in na zuar tsun taŋka ka peʔ a ʈul lo diŋ (Lai)*

2Sg house 2Sg sold COND money 1Sg give 3Sg need NEG MOD

'If you sold your house, I will not have to give you money'

b) *i in i hralʔ tʃuan pɔisa ka pek tʃe a ŋai lo aŋ (Mizo)*

2Sg house 2Sg sold COND money 1Sg give 2ACC 3Sg need NEG MOD

'If you sold your house, I will not have to give you money'

c) *na o na zua kʰia-ta-la pʰusa ei tɕa piepa a-byuʔ-vei (Mara)*

2Sg house 2Sg sold COND money 1Sg 2Sg give 3Sg-need-NEG

'If you sold your house, I will not have to give you money'

d) *na paʔno pa-tɕa rei te (Mara) (Lorrain, 2016, p-240)*

2Sg know COND say MOD

'If you know say so'

The subordinator *kʰa-se-la/maʔ-se* is 'concessive conditional' which is used to refer to clauses analogous to 'even if' clauses in English, which code the relation 'frustrated implication' (Thompson, Longacre, & Hwang 1985). It is also used as coordinator where it is used as counter-expectational adversative. While Lai and Mizo have only one concessive conditional subordinator, Mara has a number of concessive of it namely- *hra-sa-la, pa-tɕʰao-ta, ply-ly, ta-rɔ-pa-ta*, and *tlô* – which are equivalent to although, yet, still or even if.

10. a) ruaʔpi sur kʰa-se-la ka tʰau diŋ (Lai)

rain fall COND 1Sg going home MOD

'Even if it rains, I will go back home'

b) ruaʔ sur maʔ-se ka hɔ tʰo aŋ (Mizo)

rain fall COND 1Sg going home still MOD

'Even if it rains, I will still go back home'

c) *vasua hra-sa-la ei tʰyu o (Mara)*

rain COND 1Sg going home MOD

'Although it rains, I will still go back home'

d) *ei si ta tlô tɕi, kʰazia na si vei ? (Mara) (Lorrain, 2016 p-361)*

1Sg to go say although 2Sg Q 2Sg to go NEG

'Although you said I will go, you haven't gone, why not?'

In Mizo, the subordinate adverbial conjunctions besides *tʃuan* and *maʔse,* we have *nise* and the modified form of *ni-se* such as *ta-se* (If), *i-la* (for first person), *ni-la* (for second person), *u-la* (for third person), *ni-se-la* (for finite verb) and *se-la* (for non-finite verb). These subordinate adverbial conjunctions can also be used by joining them together *ni-maʔ-se-la, maʔ-i-la, maʔ-la, maʔ-u-la, ni-ta-se, ni-ta-se-la, ni-ta-i-la, ni-ta-la, ni-ta-u-la, ni-ta-se,* and *ni-*

ta-se-la. When *tʃuan* (determiner) is added behind the other subordinate adverbials, the event does not turn into that of a present but remain as a past, thereby meaning that the addition of *tʃuan* does not affect the semantic content of the sentence.

11. a) lo ti ni-se kan buai lo aŋ
hither do COND 1Pl worried NEG MOD
'If it was done by him/her, we won't have to worry so much'

b) naŋ ni-i-la ka hɔ miaʔ-lo aŋ
2Sg COND 1Sg go home INT-NEG MOD
'If I were you, I would not have gone home'

c) naŋ ni-la i hɔ miaʔ-lo aŋ
2Sg COND 2Sg go home INT-NEG MOD
'If it was you, you would not have gone home'

d) ka t^hu ɔiʔ u-la tʃuan in kal tur
1Sg word follow COND DET 2PL go MOD
'If you had followed my words, you could have gone'

e) infiam ni-se-la i ^hmu aŋ
play COND 1Pl see MOD
'You would have seen him/her, if he/she had played'

f) ret^hei ni-ta-se-la tʃuan t^hil tr^ha a nei lo aŋ
poor COND DET things good 3Sg have NEG MOD
'If he/she was poor, he/she would not have nice things'

In Lai the suffix *-la* is added after the conditional adverbial subordinator – *se-la, si-ɔ-la* (for second person), *lau-leʔ-la* (for third person), and *si-seʔ-la* (for finite verb). There is one subordinator that does not use the *-la* suffix, i.e. *si-niŋ-na* (example 13). The reason for this can be because of assimilation where the preceding phoneme */ŋ/* assimilate the */l/* sound to */n/* sound. From the following examples we can also see the presence of a determiner *tsu* after the conditional adverbial subordinator. This is optional as we can see the absence in example (9-a) above. This determiner can also be inserted in Mizo (*tʃu* or *tʃuan)* as well; however, their absence does not lead to the ungrammaticality of the sentence.

12. a) rak ti se-la tsu kan buai lau diŋ
hither do COND DET 1Pl worried NEG MOD

'If it was done by him/her, we won't have to worry so much'

b) naŋ si-ɔ-la tsu na hɔ mia? lau diŋ

2Sg COND DET 2Sg go home NEG MOD

'If it was you, you would not have gone home'

c) *ka t^husim el lau-le?-la tsu nan fe? diŋ*

1Sg word follow COND DET 2PL go MOD

'If you had followed my words, you could have gone'

d) *lehɔ se-la tsu nan ^{h}mu diŋ*

play COND DET 1Pl see MOD

'You would have seen him/her, if he/she had played'

e) *harsa si-se?-la tsu t^hilri tr^ha a nei lau diŋ*

poor COND DET things good 3Sg have NEG MOD

'If he/she was poor, he/she would not have nice things'

13. *naŋ si-niŋ-na tsu ka hua lau diŋ*

2Sg COND DET 1Sg go home NEG MOD

'If I were you, I would not have gone home'

Mara also has the suffix *-la* added after the conditional adverbial subordinator – *sa-la, tɛa-sa-la, tɛa-la* (for first person), *tɛa-u-la* (for third person), *tɛa-ei-sa-la* (for finite verb), *vei-k^hia-ta-la* (unless) and *vei-k^hia-la*. Determiner *tɛa* is also used after the conditional adverbial subordinator and it also optional like in the other two language.

14. a) *vɔ tao sa-la tɛa bua ma-pi*

hither do COND DET worried NEG

'If it was done by him/her, we won't have to worry so much'

b) *na tɛa-sa-la di rai va-na*

2Sg COND go home MOD NEG-2Sg

'If I were you, I would not have gone home'

c) *nama tɛa-la adi rai va-tɛi*

2Sg COND to go MOD NEG-2Sg

'If it was you, you would not have gone home'

d) *ei rei azy?pa tɛa-u-la vɔ rai vei ei tɛi*

1Sg speech follow COND hither MOD NEG 1Sg 2Sg

‘If (you) had followed my words, you could have gone’

e) *atɛatoʔpa tɛa-ei-sa-la tɛa nama hmô ɔ*

play COND DET 1Pl to see MOD

‘You would have seen him/her, if he/she had played’

f) *riet^{h}eipa tɛa-sa-la tɛa hmo p^{h}apa n^{h}ei ɔ vei*

poor COND DET things good have MOD NEG

‘If he/she was poor, he/she would not have nice things’

g) *na zu vei-k^{h}ia-la ei ty tɛa pi va-na (Lorrain, 2016 p-374)*

2Sg go unless 1Sg money hither give NEG-2Sg

‘Unless you go, I will not give you the money’

b. Temporal Adverbial Clauses

According to Diessel (2001) temporal clauses indicate a specific temporal relationship between main and adverbial clause. For marking temporal adverbial clause that provides information about when an action happens that links to the main clause in a sentence, these languages use adverbial subordinators *hunaʔ* (when) by both Lais and Mizos and *tɔʔ-ta* and *pa-tɔ-na-ta (when)* by Maras. As seen in the following temporal adverbial clause ‘When s/he come’ tells us when ‘we will start eating’. This temporal conjunction is used when the matrix sentence carries a future reference. The adverbial clause-final position is where the subordinating conjunction appears. It can also be seen that Mara often drops the person marker in the subordinate clause which is not seen in the other two language.

15. a) a rɔn hunaʔ kan ei tran diŋ (Lai)

3Sg come when 1Pl eat start MOD

‘When s/he come, we will start eating’

b) a lo kal hunaʔ kan ei tran aŋ (Mizo)

3Sg hither come when 1Pl eat start MOD

‘When s/he come, we will start eating’

c) *avø tɔʔ-ta eima nie pat^{h}ao ɔ (Mara)*

come when 1Pl eat start MOD

‘When (s/he) come, we will start eating’

Other temporal adverbial subordinators are *viala? /vela?* (as soon as) and *hlan/^{h}ma/ hlaleitala/tai/hlaviala/hlahleila/hlahlei* (until/before, specifies time limit for an action). In temporal adverbial clauses, the subordinating conjunction *hlan/^{h}ma/ hlalei/tai/hlaviala/hlahleila/hlahlei* are also used when the matrix sentence carries a future reference, while *viala? /vela?* can be used for both future (16) and past (17) reference in Lai and Mizo. Mara has more conjunction particles compared to the other two languages. They have *tɔ?-ta* for future temporal marker (16-c) and *pa-ta-na-ta* for past marker (17-c) despite the lack of the equivalent for *as soon as*. Example (18-d) also shows another type of temporal subordinator used for the equivalent of *until* where the clause 'until I come' is a temporal adverbial clause that specifies the time limit for the action (stopping). It indicates that the action of stopping should continue up to the point when the speaker arrives. Mara also shows different realization of temporal adverbial subordinators such as *hla-lei-ta-la* (for second person), *hla-lei-ta* (for third person), *hla-via-la, hla-hlei-la, hla-hlei* which all refers to *until,* like the ones we have seen in the previous adverbial clause, however this is absent in the other two language for temporal adverbial subordinators.

16. a) a rɔn viala? kan ei tran diŋ (Lai)
3Sg come as soon as 1Pl eat start MOD
'As soon as s/he come, we will start eating'

b) a lo kal vela? kan ei tran aŋ (Mizo)
3Sg hither come as soon as 1Pl eat start MOD
'As soon as s/he come, we will start eating'

c) *avø tɔ?-ta eima nie pat^{h}ao ɔ (Mizo)*
come when 1Pl eat start MOD
'When (s/he) come, we will start eating'

17. a) ka t^{h}len viala? ka ti ŋ^{h}al (Lai)
1Sg arrive as soon as 1Sg do immediately
'I start doing it as soon as I arrive'

b) ka t^{h}len vela? ka ti ŋ^{h}al (Mizo)
1Sg arrive as soon as 1Sg do immediately
'I start doing it as soon as I arrive'

c) *ei-tlo pa-ta-na-ta ei taopa-ha (Mara)*

1Sg-arrive when 1Sg to do immediately

'I start doing it as soon as I arrive'

18. a) bus rɔn hlan tsu ka lau lɔhpi diŋ (Lai)

bus come until DET 1Sg hither wait MOD

'I will wait with you until/before the bus come'

b) bus lo kal ^{h}ma tʃu ka lo hŋaʔpui aŋ tʃe (Mizo)

bus hither come until DET 1Sg hither wait MOD 2ACC

'I will wait with you until/before the bus come'

c) *bus avø hla-lei-ta-la ei tɛa vɔ hak^{h}ei ɔ (Mara)*

bus come until 1Sg 2Sg hither wait MOD

'I will wait with you until/before the bus come'

d) *kkei k^{h}yna tai y (Mara) (Lorrain, 2016, p- 327)*

1Sg come until to stop

'Stop until I come'

The conjunctive particle *-in* is also used as a temporal adverbial subordinator and it comes with other temporal conjunctions or other morphemes. The conjunctive particle *-in* is used for present as well as past reference. When the conjunctive suffix is used with ^{h}*ma* (Mizo), it turns the future reference to that of past (19). The events in the main clause take place before the subordinate clause in (19), while subordinate and main clauses take place concurrently in (20) (according to the participle with the progressive marker). In Mizo, the conjunctive adverbial particle *-in* is used only with ^{h}*ma* and *lai* and nothing else while in Lai it is used only with *lai* (20-a) progressive marker which indicate simultaneous action. Mara lacks the *-in* conjunctive particle, nevertheless it has a separate subordinator for actions that take place subsequently, i.e. *no-ta* (20-c). We can also see that the main clause precedes the subordinate clause, however this is a matter of emphasis for all the three languages. Starting with the temporal clause emphasizes the time frame or the context of the action and placing it later in the sentence emphasizes the main action.

19. a) bus rɔn hlan tsu ka lau lɔhpi (Lai)

bus come until DET 1Sg hither wait

'I wait with him/her until the bus came'

b) bus lo kal ^{h}ma-in ka lo ^{h}ŋaʔpui (Mizo)

bus hither come until-CPT 1Sg hither wait

'I wait with him/her until the bus came'

c) *bus avø hla-lei-ta ei tɛa vɔ hak^{h}ei ɔ (Mara)*

bus come until 1Sg 2Sg hither wait MOD

'I wait with him/her until the bus came'

20. *a) a rot lai-in rɔl kan ei (Lai)*

3Sg go PROG-CPT food 1Pl eat

'We were eating while s/he came'

b) a lo kal lai-in tʃɔ kan lo ei (Mizo)

3Sg hither go PROG-CPT food 1Pl hither eat

'We were eating while s/he came'

c) *avø no-ta pati ei nie (Mara)*

come while food 1Pl to eat

'We were eating while (s/he) came'

c. Causal Adverbial Clauses

Causal clauses give an explanation or justification for the related proposition (Diessel, 2001). Lai has only one causal subordinator namely *ruaŋaʔ*, while in Mizo and Mara there are two causal subordinators namely *vaŋin* and *tʃ^{h}antʃu,* and *vata* and *tɛ^{h}apa* respectively. While *tʃ^{h}antʃu* and *tɛ^{h}apa* are a clause-initial subordinator and comes after the main clause, subordinator *ruaŋa, vaŋin* and *vata* are a clause-final subordinator that can both precede and follow the main clause.

21. *a) a rɔn thlen har ruaŋaʔ kan tlai (Lai)*

3Sg come arrive late CONJ 1Pl late

'We were late because he/she came late'

b) a lo kal har vaŋin kan tlai (Mizo)

3Sg hither come late CONJ 1Pl late

'We were late because he/she came late'

c) *avø hɔʔpa vata eima hɔ (Mara)*

come late CONJ 1Pl late

'We were late because he/she came late'

22. a) *kan tlai tʃʰantʃu a lo kal har vaŋ (Mizo)*
1Pl late CONJ 3Sg hither come late reason
'The reason why we were late was because he/she came late'
b) *ima hɔna tɕʰapa tɕa avø hɔʔpa va (Mara)*
1Pl late CONJ hither come late reason
'The reason why we were late was because he/she came late'

d. Manner Adverbial Clauses

An adverbial clause of manner explains the manner in which the action mentioned in the main clause of the sentence is occurring or has already occurred. In Lai and Mizo, when a lexical item defines manner in its meaning, the adverbial clause expressing that manner is expressed by appending the conjunctive participle *-in* to it. The conjunctive participle must be employed in order to build adverbial clauses since the lexical components cannot be used alone. It occurs in the final place of the subordinate clause, which occurs either at medial or initial part of the clause. However, we can see that in (23-a) the *ruaŋaʔ* is used for manner adverbial subordinator which was also used in the previous causal adverbial clause. Mara does not use the conjunctive particle rather it has two manner subordinators namely *hmo-lei-pa* and *hɔta.*

21. a) rami tsun min ʰmu lauʔ ruaŋaʔ in feʔ-san (Lai)
rami DEF 1ACC see NEG CONJ 3Sg go-RELQ
'Rami left me as though/like she didn't see me'
b) rami tʃuan min ʰmu lo aŋ mai-in min kal-san (Mizo)
rami DEF 1ACC see NEG like just-CONJ 1ACC go-RELQ
'Rami left me as though/like she didn't see me'
c) *ram tatɕa na hmo-lei-pa hɔ tlaita eina sie pa-kʰo (Mara)*
ram to leave 1Sg as though MOD self 1Sg go RELQ-to get out of sight
'Ram left me as though/like she didn't see me'

22. a) mina veʔ-in a tɔŋ (Lai)
sick like-CONJ 3Sg talk

'He/she talked as though/like he/she is sick'

b) damlo aŋ-in a trɔŋ (Mizo)

sick like-CONJ 3Sg talk

'He/she talked as though/like he/she is sick'

c) tlaleipa hɔta bie arei (Mara)

sick as though 3Sg talk

'He/she talked as though/like he/she is sick'

e. Purposive Adverbial Clauses

According to Diessel (2001) purpose clauses specify the purpose or objective of the action mentioned in the main clause. The purposive adverbial subordinators are *diŋin, turin* and *ɔ-pa-ta* which occurs at the subordinate clause's final position, and might be either at the beginning or the final part of the sentence. Lai and Mara use *diŋaʔ* and *nɔ-pa-ta* respectively depending on the specificity of the subject, and the focus of the purpose.

23. a) ti in diŋin tsuak (Lai)

water drink PURP went out

'(S/he) went out to drink water'

b) tui in turin a tʃ^{h}uak (Mizo)

water drink PURP 3Sg went out

'S/he went out to drink water'

c) *ti doʔ ɔ-pa-ta a pua (Mara)*

water drink PURP 3Sg went out

'S/he went out to drink water'

24. a) mɔi in ^{h}na-tuan-nak diŋaʔ mɔtɔ a lei (Lai)

mawi ERG work-place-NMZR PURP motor 3Sg buy

'Mawia bought a motor/car to use for work'

b) mɔia-n ^{h}na-t^{h}ɔh-na turin motor t^{h}ar a lei (Mizo)

mawia-ERG work-work-NMZR PURP motor new 3Sg buy

'Mawia bought a new motor/car to use for work'

c) *mɔi ta rai hria nɔ-pa-ta motor t^{h}iepa a tɛalei (Mara)*

mawi ERG work-place PURP motor new 3Sg buy

'Mawia bought a new motor/car to use for work'

f. Substitutive Adverbial Clauses

According to Thompson (1985), substitutive clause is used for signalling the replacing of an expected event by an unexpected one. In Lai and Mizo, substitutive subordinate marker is *ai* (instead of, rather, in place of) and the verb must be non-finite. It can come along with the suffix *-in,* conditional subordinate *tʃuan,* or the suffix *-aʔ* and occur at the final position of the subordinate clause before the main clause. Mara has three substitutive subordinate markers, i.e. *ei-ta, vyuʔ-ta* and *rai.* These subordinators can also come with other subordinators where in Lai and Mizo they are followed and in Mara they are preceded (27). The implication of the substituted clause's time reference is dependent on the main clause.

25. a) *keimaʔ min pek ai ka nau an pek sɔn (Lai)*
1Sg 1ACC give instead 1Sg young sibling 3Pl give COMP
'Instead of giving it to me, they gave it to my younger sibling'
b) *keimaʔ min pek ai ka nau an pe (Mizo)*
1Sg 1ACC give instead 1Sg young sibling 3Pl give
'Instead of giving it to me, they gave it to my younger sibling'
c) *kei eina pie vøuʔ ei-ta ei naɔʔtapa ama pie (Mara)*
1Sg 1Sg give one's share instead 1Sg young sibling 3Pl give
'Instead of giving it to me, they gave it to my younger sibling'

26. a) *tʰasun i feʔ n̥ak-kin tusuan-aʔ ka feʔ (Mizo)*
tomorrow 3Sg go instead today-LOC 1Sg go
'Instead of going tomorrow, I went today'
b) *naktuk a kal aiin vɔiin-aʔ ka kal (Mizo)*
tomorrow 3Sg go instead today-LOC 1Sg go
'Instead of going tomorrow, I went today'
c) *myla a vɔ ɔpa vyuʔ-ta tan-oʔ a vɔʔ (Mara)*
tomorrow 3Sg go then instead today-LOC 1Sg go
'Instead of going tomorrow, I went today'

27. a) *tsa zir n̥akai tsun n̥a tuan paiʔ sɔn (Mizo)*

paper study rather COND work work want COMP

'He/she wants to works rather than study'

b) *leʔk^{h}a zir ai tʃuan ^{h}na a t^{h}ɔk duʔ zɔk (Mizo)*

paper study rather COND work 3Sg work want COMP

'He/she wants to works rather than study'

c) *tɛa atɛu ɔpa hla-ta-la rai r^{h}ia a k^{h}o via (Mara)*

paper study then COND instead of work 3Sg want COMP

'He/she wants to works rather than study'

g. Additive Adverbial Clauses

Additive adverbial clause are those clauses that convey two states of affairs at once (Thompson, 1985). In Lai and Mizo, the additive adverbial subordinator is the morpheme *bakaʔ* (in addition to/besides). It comes with only participial form of verb and also occurs at the final position of the subordinate clause. Besides *bakaʔ* Lai also use *t^{h}ɔn,* while Mara has only one additive subordinator namely *hleik^{h}o-ta.*

28. a) *saza a siʔ bakaʔ tsabu a ziak t^{h}eu (Lai)*

teacher 3Sg COP besides book 3Sg write HAB

'In addition to being a teacher, he/she also writes book'

b) *zirtirtu a niʔ bakaʔ a leʔk^{h}abu a ziak tr^{h}in (Mizo)*

teacher 3Sg COP besides 3Sg time spare-LOC book 3Sg write HAB

'In addition to being a teacher, he/she also writes book'

c) *Patɛutuʔpa a tɛa hleik^{h}o-ta tɛabu a ro tyʔ (Mara)*

teacher 3Sg COP besides book 3Sg write HAB

'In addition to being a teacher, he/she also writes book'

29. a) *tsa zir t^{h}ɔn ^{h}na t^{h}ɔʔ a trul (Lai)*

paper study besides work work 3Sg need

'Besides studying, I need to work'

b) *leʔk^{h}a zir bakaʔ ^{h}na t^{h}ɔʔ a ŋai (Mizo)*

paper study besides work work 3Sg need

'Besides studying, I need to work'

c) *tɛa atɛupa hleiko-ta hria ɔpa a-byuʔ (Mara)*

paper study besides work then 3Sg-need
'Besides studying, I need to work'

4. Conclusion

It can be seen that adverbial clauses play a vital role in Lai, Mizo and Mara in enhancing sentence complexity and clarity. By providing information about time, cause, purpose, condition, or manner, these clauses offer nuanced relationships between ideas. These three languages demonstrate fascinating structural and functional diversity, shaped by numbers of converbs, and intricate syntactic patterns. The cross-examination shows close similarities especially when it comes to Lai and Mizo who shares a number of similar subordinators, and differences with Mara who shows more complexity and diversity in morphological as well as structural patterns. By understanding these unique constructions, we gain deeper insight into the expressive potential of Tibeto-Burman languages and their contribution to the study of linguistic typology.

Language	Conditional	Temporal	Causal	Manner	Purposive	Substitutive	Additive
Lai	*tsun, kʰa-se-la, se-la, si-ɔ-la, lau-leʔ-la, si-seʔ-la, si-niŋ-na*	*hunaʔ, vialaʔ, hlan*	*ruaŋaʔ*	*-in, ruaŋaʔ*	*diŋin, diŋaʔ*	*ai, aiaʔ*	*bakaʔ, tʰɔn*
Mizo	*ʧuan, maʔ-se, nise, ta-se, i-la, ni-la, u-la, ni-se-la, se-la, ni-maʔ-se-la, maʔ-i-la, maʔ-la,*	*hunaʔ, velaʔ, ʰma*	*vaŋin, ʧʰantʃu*	*-in*	*turin*	*ai, aiin, aiaʔ*	*bakaʔ*

	maʔ-u-la, ni-ta-se, ni-ta-se-la, ni-ta-i-la, ni-ta-la, ni-ta-u-la, ni-ta-se, ni-ta-se-la.						
Mara	*k^hia-ta-la, pa-tɛa, hra-sa-la, pa-tɛ^{h}ao-ta, ply-ly, ta-rɔ-pa-ta, tlô, sa-la, tɛa-sa-la, tɛa-la, tɛa-u-la, tɛa-ei-sa-la, vei-k^hia-ta-la, vei-k^hia-la*	*tɔʔ-ta, pa-tɔ-na-ta, tɔʔ-ta, pa-ta-na-ta, hla-lei-ta-la, tai,hla-via-la, hlah-lei-la, hlah-lei, hla-lei-ta*	*vata, tɛ^{h}apa*	*hmo-lei-pa, hɔta*	*ɔ-pa-ta, nɔ-pa-ta*	*ei-ta, vyuʔ-ta, rai*	*hleik^{h}o-ta.*

Table.1. List of Adverbial subordinators in Lai, Mizo and Mara

Abbreviations

1	first person	BEN	benefective
2	second person	CAUS	causative
3	third person	COM	comitative
ACC	accusative	COMP	comparative

COND conditional	MAL malefactive
COP copula	MOD mode
DEM demonstrative	NEG negation
DET determiner	NMZR nominalizer
ERG ergative	Pl plural
F female	PROG progressive
HAB habitual	RCP reciprocal
INST instrumental	REF reflexive
LOC locative	RELQ relinquitive
M male	Sg singular

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Measurement of Stuttering Severity-A Comparison between Subjective and Objective Methods

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Abstract

Introduction

Stuttering is a communication disorder, characterized by repetition of sounds, syllables, or words; prolongation of sounds; and interruptions in speech known as blocks which may be accompanied by struggle behaviours, such as rapid eye blinks or tremors of the lips.

Methodology: This study investigated the correlation of 2 stuttering measurement tools: an objective measurement of different behaviours of stuttering assessed using a computer and the subjective severity assessment done by the clinician. The number of different stuttering behaviours and their duration were calculated using a computer. Three experienced speech pathologists rated stuttering severity by listening to the audio recording of reading and spontaneous speech samples of 10 stuttering and 10 nonstuttering participants.

Results: Results showed very high intra-judge and inter-judge agreement for both measures. There was a strong linear correlation between subjective stuttering severity assessment done by the judges and stuttering severity scores calculated by the computer. The finding of this study suggests that the two measures can be regarded as interchangeable. Hence the results of the current study can be used to develop an algorithm to measure severity assessment which will be more objective measure than the traditional perceptual evaluation by clinician.

Introduction

Stuttering is a fluency disorder affecting communication , characterized by repetition of sounds, syllables, or words; prolongation of sounds; and interruptions in speech known as blocks which may be accompanied by struggle behaviours, such as rapid eye blinks or tremors of the lips(1). The exact causes for stuttering are not precise.

Various measures of assessing the severity of stuttering are available. These are either (1) perceptual rating, where the clinician rates the severity of the behaviours according to a scale, or (2) counting instances of specific stuttering behaviours or measuring the duration of specific behaviours.

Subjective Perceptual rating scales have been widely used for overall estimation of the severity based on the perception of the clinician, for example Martin et al. (1988) proposed a scale with satisfactory intra-judge reliability and inter-judge reliability, which has a 9-point scale, where one is labelled "mild," and nine is labelled "severe." There are no descriptions of any symptoms (2).

Another measurement method of stuttering severity is calculating the percentage of stuttered syllables/ words whereby the number of stuttered syllables/words is related to overall spoken syllables/words (3). The percentage duration of different stuttering behaviours has also been used to find stuttering severity (4).

Different stuttering behaviours like part-word repetitions, whole-word repetitions, phrase repetitions, prolongation, pauses, and interjections with their frequency of occurrence have been tabulated to describe the severity by some researchers(5). The Stuttering Severity Index

(SSI-IV) was developed to assess the severity of stuttering based on frequency, duration, and physical concomitants combined into one stuttering severity score (6). However, doubts have been raised about the test's inter and intra-judge reliability (7).

There are also rating scales where the patient marks severity based on his/her difficulty .The Overall Assessment of the Speaker's Experience of Stuttering is a self-reported measure with 100 items across four sections (I General information, II Reactions to stuttering, III Communication in daily situations, and IV Quality of life), scored against a 5-point Likert scale (8).

Computer programs like CASPER, Video Voice, and Bakker's program have been developed to count stressed syllables and voice initiations automatically. (9) The Institute for Stuttering Treatment and Research, Edmonton, has developed an electronic button-press event recorder to facilitate the manual counting of syllables and manual registration of stuttering events or disfluencies (10)

The present study aimed to compare subjective clinician-based judgment of severity by calculating the number of different stuttering behaviours and their duration assessed using a computer.

Objectives of the Study

The aim of the study was to find the correlation between different stuttering behaviours assessed using a computer and the subjective severity assessment performed by the clinician.

Methodology

Consents were taken concerning the participation in the study after explaining the details of the study.

Participants

Two groups of subjects were included in the study. The first group consisted of 10 stutterers between the age range of 15 to 25 years and the mean age of 20, who were diagnosed clinically by a speech-language pathologist. The second group consisted of 10 normal speakers matched for age and sex.

Procedure

The subjects were seated comfortably in a sound-treated recording room with an average noise level of around 40 dB. The subjects' reading of the Rainbow Passage as well as spontaneous speech were audio recorded using a digital recorder (Sony IC Recorder, ICD-PX440).The Rainbow Passage is a standard, phonetically balanced oral reading passage used by speech-language pathologists(11). The microphone was held approximately 10 cm from the mouth of the subjects during the recording. The speech samples were recorded at a sampling rate of 44,100 Hz and with 16-bit quantization.

The following Questions were asked to elicit spontaneous speech

1) What is your name?
2) Which is your native place?
3) How old are you?
4) What are you doing?
5) What is your problem?

The Vaghmi software (Speech and Voice Systems, Bangalore, India)(12) was used to analyse the data. Speech fluency of the recorded samples produced by the subjects were quantified using two measures:

1. Subjective rating by judges - three Speech Language Pathologists (SLP) served as judges to perceptually rate the severity of stuttering after listening to the recorded sample on a five-point scale as 0-normal, 1-mild, 2 - moderate, 3-moderate-severe, 4-severe. The average of the scores by the three judges was calculated.

2. Objective measurement using computer - The samples were fed to the computer and digitized. The digitized samples were then visually displayed on the computer screen as a waveform (time intensity function) in the program "VAGHMI" developed by VSS-Bangalore(12). Then, the experimenter identified the instances of stuttering and the duration of each instance based on listening to the audio sample and the looking at the visual display simultaneously. The core stuttering behaviours considered for identification were repetitions, prolongations, blocks and interjections based on Teesson et al.'s (2003) dysfluency taxonomy (13). On identifying the stuttering moments as repetitions, prolongations, blocks and

interjections, the duration of each stuttering moment was measured by moving the cursor on the computer. The program facilitated the measurement of the duration of each of the stuttering moments. The type, number, and duration of a particular stuttering moment were registered and stored in the computer memory. The data was processed regarding the number of stuttering moments, the duration of the stuttering moments, and the rate of speech (number of syllables/second).

Criteria for Counting Core Behaviours of Stuttering:

1. Repetitions- Both syllable and word repetitions were counted. A syllable repetition as pa-pa-pa was marked as a single repetition. Each word repetition was marked separately.

2. Prolongation was considered when airflow continued but movement of the articulators stopped, producing a vowel or consonant for longer duration than beyond its appropriate duration. Eg "I fffffeel saaad"

3. Interjections- when there was a break in speech by a filler word or sounds like Ummm, Uhhh,Like, But, Mmmm, You know.eg. "I, ummm, like to eat"

4. Blocks involved stopping of both airflow and sound during the production of speech due to fixed articulatory posture for subsequent sound.

Rate of speech was calculated by dividing the total number of syllables by total time in seconds

Results

1. **Subjective Judgement of Severity of Stuttering by Speech Pathologist**.

Three Speech Language Pathologists (SLP) served as judges to perceptually rate the severity of stuttering after listening to the recorded sample on a five-point scale as 0-normal, 1-mild, 2 - moderate, 3-moderately severe, 4-severe.For intra-judge reliability calculation, rating of the recorded speech samples of all the subjects were blindly done twice by the same judges (SLP). For inter-judge reliability, the same sample was blindly rated by two other judges (SLP). The ratings were done independently and were blinded to the other clinicians' ratings and their own prior ratings.

A high intra-judge reliability was found where Judge II showed maximum reliability (correlation coefficient was 0.97), and Judge III showed minimum reliability (correlation coefficient was 0.88).

	Judge I	Judge II	JudgeIII
Intra judge reliability	0.92	0.97	0.88

Table- 1: The intra-judge reliability of judgement of severity of stuttering.

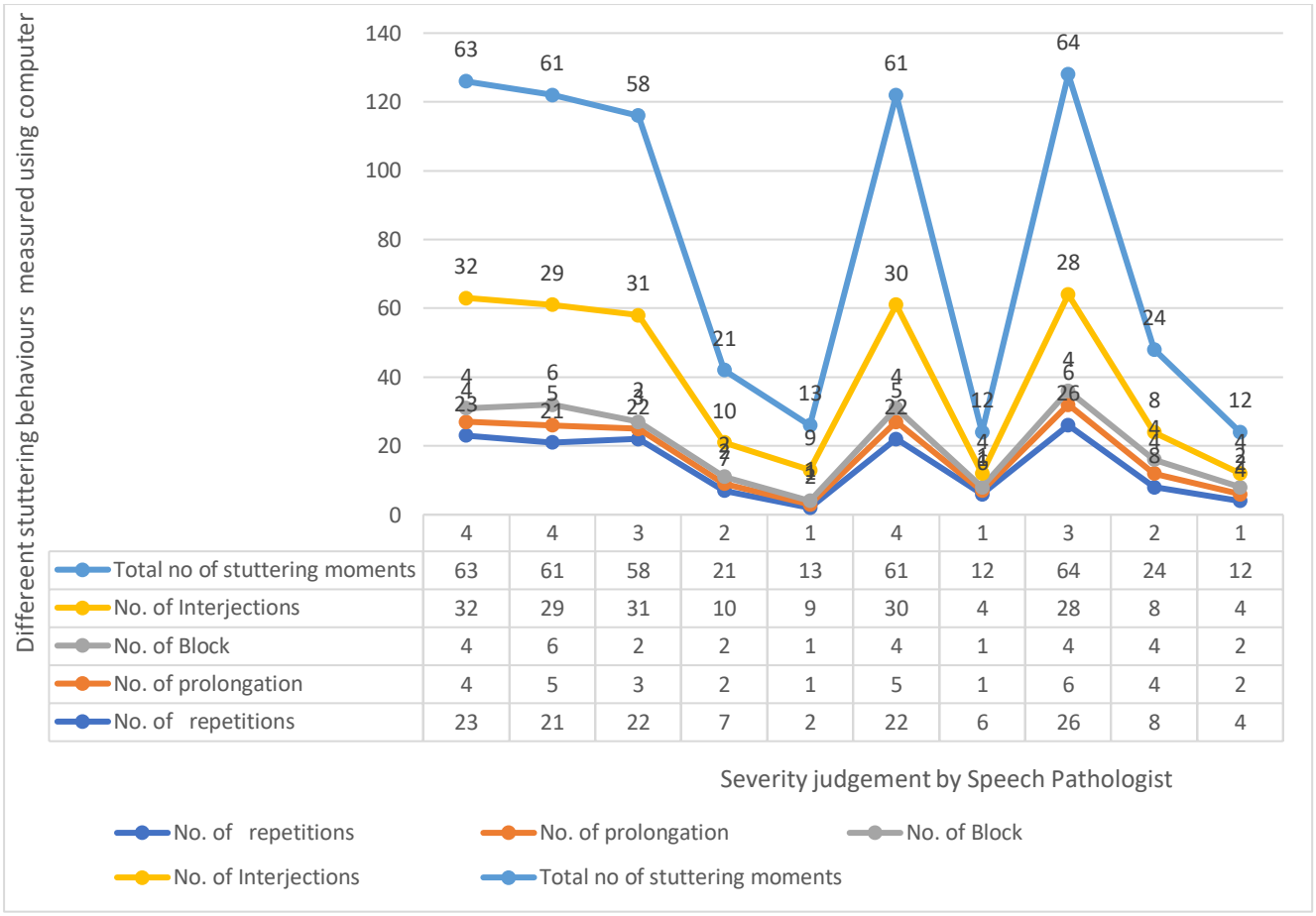
	Judge I &II	Judge II & III	Judge I & III
Inter judge reliability	0.98	0.88	0.89

Table- 2: The inter-judge reliability of judgment of severity of stuttering.

The inter-rater reliability results indicated a strong level of agreement between the raters. Correlation coefficient was 0.98 between Judge I &II, 0.88 between Judge II &III, 0.89 between Judge I &III.

2. Objective Measurement Using Computer

Tables 3 & 4 show total number of repetitions, prolongations, Interjections, and blocks as measured using the computer and the average severity judgment by the SLP's for stuttering subjects and normal subjects respectively



	4	4	3	2	1	4	1	3	2	1
Total no of stuttering moments	63	61	58	21	13	61	12	64	24	12
No. of Interjections	32	29	31	10	9	30	4	28	8	4
No. of Block	4	6	2	2	1	4	1	4	4	2
No. of prolongation	4	5	3	2	1	5	1	6	4	2
No. of repetitions	23	21	22	7	2	22	6	26	8	4

Table- 3: Total number of repetitions, prolongations, Interjections, and blocks as measured using the computer and the average severity judgment by the SLP's for the stuttering subjects

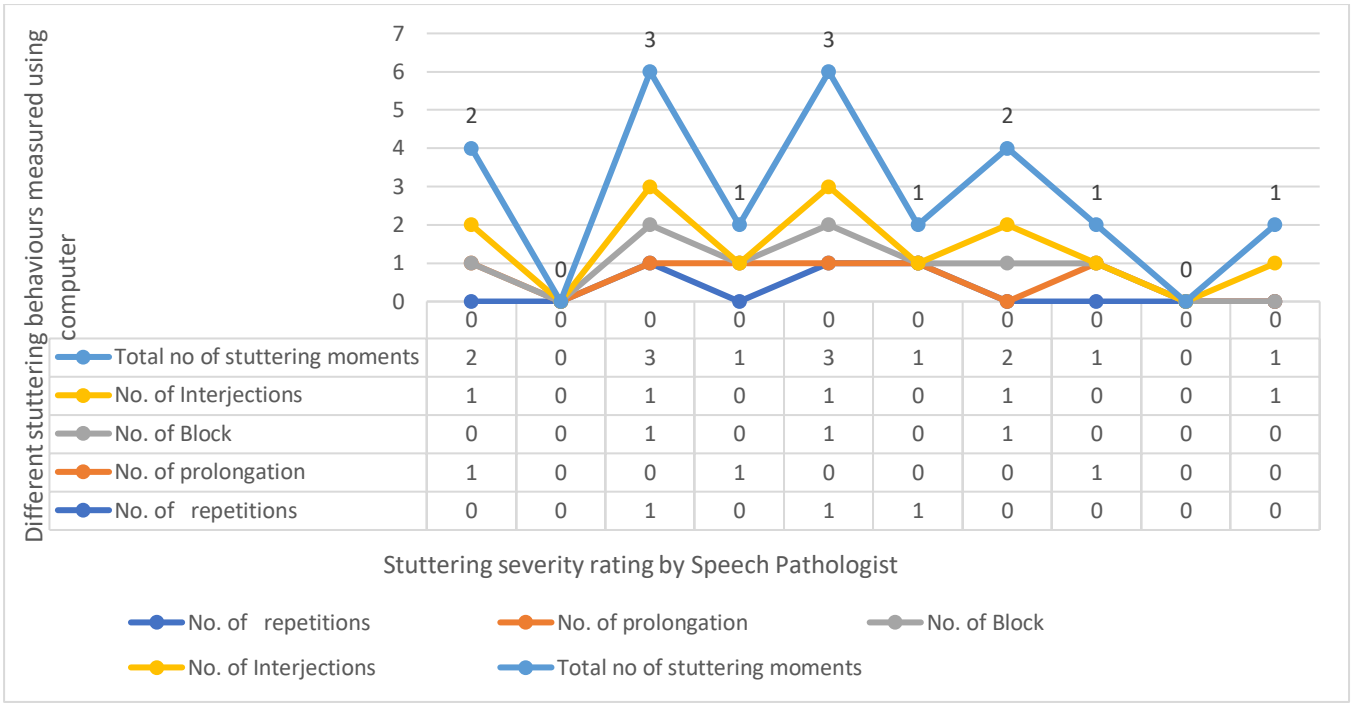
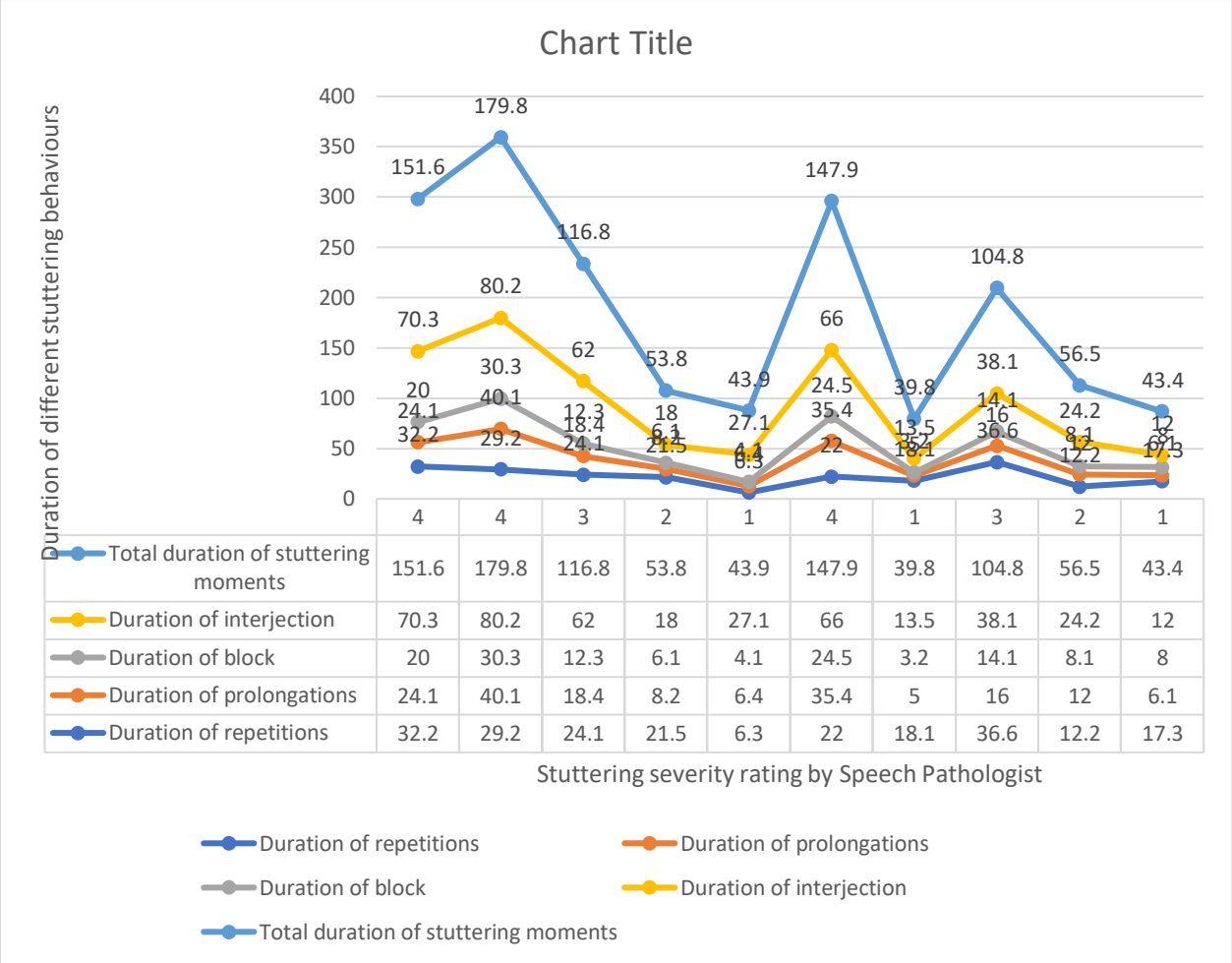


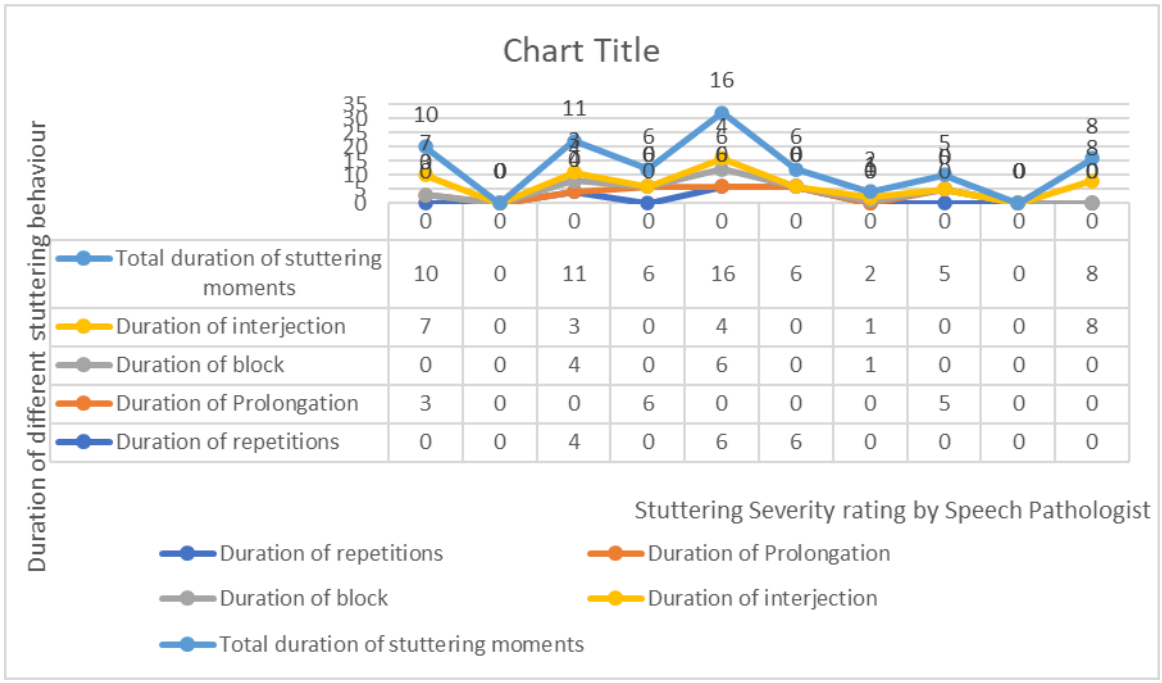
Table- 4: Total number of repetitions, prolongations, Interjections, and blocks as measured using the computer and and the average severity judgment by the SLP's for the normal subjects



	4	4	3	2	1	4	1	3	2	1
Total duration of stuttering moments	151.6	179.8	116.8	53.8	43.9	147.9	39.8	104.8	56.5	43.4
Duration of interjection	70.3	80.2	62	18	27.1	66	13.5	38.1	24.2	12
Duration of block	20	30.3	12.3	6.1	4.1	24.5	3.2	14.1	8.1	8
Duration of prolongations	24.1	40.1	18.4	8.2	6.4	35.4	5	16	12	6.1
Duration of repetitions	32.2	29.2	24.1	21.5	6.3	22	18.1	36.6	12.2	17.3

Table 5 shows total duration of repetitions, prolongations, Interjections, and blocks as measured using the computer and the average severity judgment by the SLP's for stuttering subjects.

Table- 5 and 6 shows total duration of repetitions, prolongations, Interjections, and blocks as measured using the computer and the average severity judgment by the Speech Pathologists for stuttering subjects and normal subjects respectively



	0	0	0	0	0	0	0	0	0	0
Total duration of stuttering moments	10	0	11	6	16	6	2	5	0	8
Duration of interjection	7	0	3	0	4	0	1	0	0	8
Duration of block	0	0	4	0	6	0	1	0	0	0
Duration of Prolongation	3	0	0	6	0	0	0	5	0	0
Duration of repetitions	0	0	4	0	6	6	0	0	0	0

Table- 6: Total duration of repetitions, prolongations, Interjections, and blocks as measured using the computer and the average severity judgment by the SLP's for normal subjects.

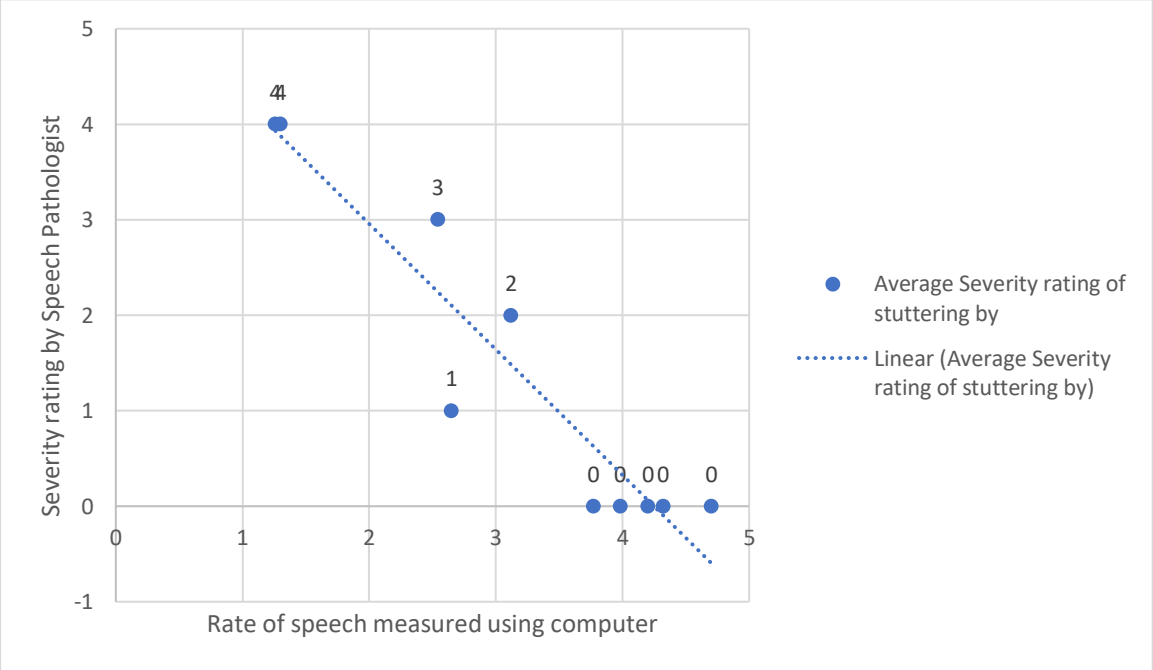
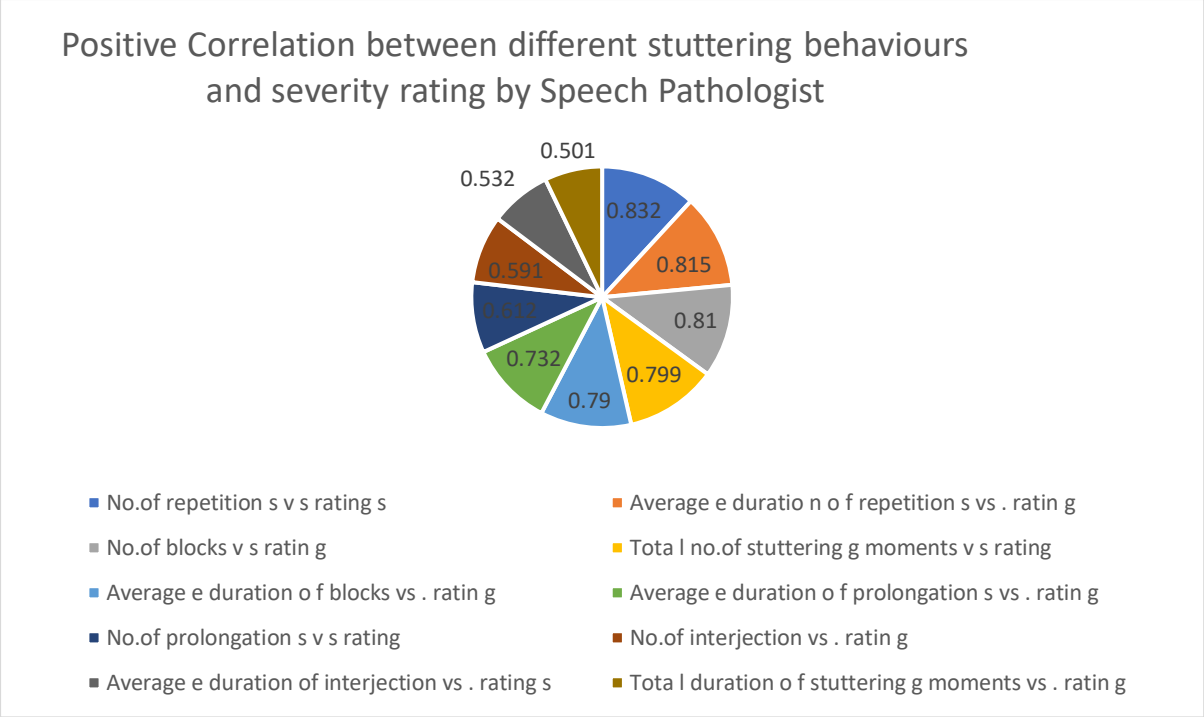


Fig 1. Rate of speech in terms of number of syllables per second as measured by the computer and the average severity judgment by the SLP's.

Spearman's coefficient of correlation was applied to find out the correlation between the severity ratings of judges and severity judgments made using computer measurements.

	Correlation between stuttering moment and rating of severity by SLP's	Correlation value (v)
1	Number of repetitions vs. rating by SLP	0.832
2	Duration of repetition vs. rating by SLP	0.815
3	No of blocks vs. rating by SLP	0.81
4	Total no of stuttering moments vs. rating by SLP	.799
5	Duration of blocks vs. rating by SLP	0.79
6	Duration of prolongation vs. rating by SLP	0.732
7	Number of prolongations vs. rating by SLP	0.612
8	Number of interjections vs. rating by SLP	0.591
9	Duration of interjections vs. rating by SLP	0.532
10	Total duration of stuttering moments vs. rating by SLP	0.501
11	Rate of speech (syllable/sec) measured using computer vs. rating by SLP	-0.821

Table 8: Correlation between different stuttering behaviours assessed using a computer and the subjective severity assessment performed by the SLP's.



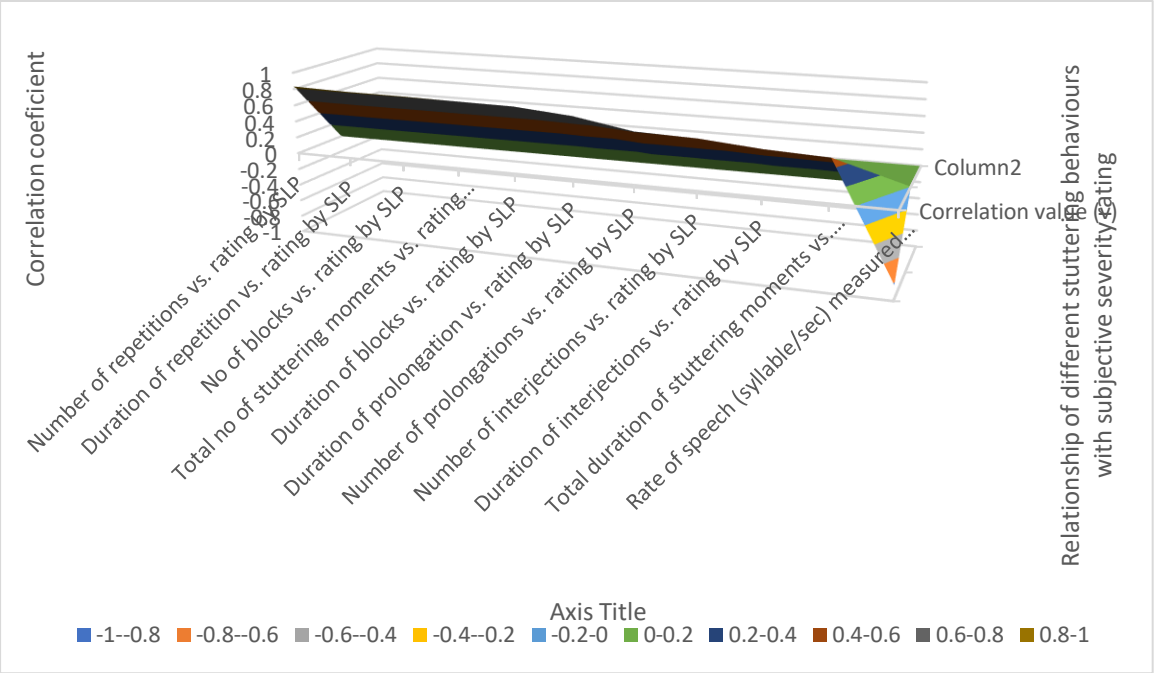


Fig 2. Correlation coefficient value for the relationship between different stuttering behaviours assessed using a computer and the subjective severity assessment performed by the SLP's.

Discussion

Clinically, perceptual evaluation of stuttering is usually done using severity rating-scales, where numerical value is assigned on an ordinal scale or marks a rating on visual-analog scale to represent the perceived overall stuttering severity (14,15) , which are simple to use, and does not require any equipment**.** To reduce judgement bias, rather than relying on a single judge, it is desirable to have multiple judges. In our study, three Speech Pathologists served as judges to perceptually rate the severity of stuttering after listening to the recorded sample on a five-point scale as 0-normal, 1-mild, 2 - moderate, 3-moderately severe, 4-severe.

All the three judges were consistent in their judgments, as demonstrated by the high correlations between their repeated ratings (Table 1).

Results also demonstrated that the three judges evaluated stuttering severity similarly using the perceptual rating scale as indicated by high correlation between the ratings of the three judges (Table 2)

The study aimed to find the correlation between the severity of stuttering, as judged by speech-language pathologists, and the severity of the stuttering, as measured using a computer program. The number of stuttering moments, the average duration of stuttering moments, and the rate of speech (number of syllables/second) were measured using computer. The core behaviours identified as stuttering behaviour vary slightly from one author to another (16) Van Riper identified repetitions, prolongations, and blocks as the basic core behaviours of stuttering (3)and according to Wingate the behaviours included repetitions, hesitations, prolongations, interjections, and broken words during speech (17). Johnson's classification system focuses on interjections, repetitions, revisions, broken words, incomplete phrases, and prolonged sounds (18).The terms used in this labelling by different authors are almost synonymous but is vaguely defined (e.g., "tense pause" and "blocks," or "broken words" and "part-word repetition").
Teesson et al opined that reducing the number of categories into limited number of self-defining categories would enhance inter- and intra-judge agreement(13). Teesson et al.'s (2003) dysfluency taxonomy has three main categories: repeated movements, fixed postures, and superfluous behaviours.(13).

The core stuttering behaviours considered by us in our study were repetitions, prolongations, Interjections, and blocks, based on Teesson et al.'s (2003) dysfluency taxonomy (13).

Repetitions come under the category of repeated movements, prolongations and blocks come under the category of fixed postures and interjections under superfluous behaviours.
Among the different stuttering behaviours that was taken under study, interjections and repetition were found to be the most frequently observed stuttering behaviours followed by blocks and prolongations (Table 3). Blocks have been attributed to inappropriate tensing of muscles at the level of the glottis (19) or due to obstruction either at the respiratory, laryngeal, and/or articulatory levels of speech production (20).

Table 6 shows that all the stuttering behaviour assessed using computer had a positive correlation with the subjective severity assessment performed by clinician except rate of speech, which showed a high negative correlation (-0.82).

Rate of speech of normal subjects varied from 3.7 to 4.7 syllables per second and 1.3 to 2.65 syllables per second for stuttering subjects. We have found that the rate of speech reduced with increase in severity among stutterers. A high negative correlation of 0.82 was found between rate of speech in syllables/second as measured using computer and severity of rating of stuttering by the Speech Pathologist .Speech rate can reflect the severity of an individual's stuttering, with reduction in speaking rate with increase in severity(21,22).Speaking rate can be measured as the number of either syllables or words produced per minute, with syllable counts being the preferred method(20,21). We had measured speaking rate as syllable per second. The speaking rate for a normal person is around four syllables per second / 160-230 syllables per minute/ 150 words per minute (14,15) and can vary between 3.3 and 5.9 syllables per second (16). The rate of speech is reduced in stutterers because stuttering behaviours like repetitions, prolongations, blocks, and pauses naturally slow down the rate of speech.

Among the behaviours which showed positive correlation, number of repetitions (0.83) , duration of repetition (0.81), number of block (0.81) had more effect on judgement of severity of stuttering when compared to duration of block (0.79), duration of prolongations (0.73), number of prolongations (0.61), number of interjections (0.59).Total number of stuttering

moments (0.79) correlated more than total duration of stuttering moments (0.50) towards severity rating of stuttering by judges.

The high correlation between the measurement of severity using computer and the listeners' subjective evaluation of stuttering severity suggests that they provided same results and can be used interchangeably. Hence the results of the current study can be used to develop a computer assisted severity assessment which will be more objective measure than the traditional perceptual evaluation by clinician. Algorithms can also be developed for automated segmentation and calculation of severity which can be used as smartphone application where an ongoing assessment of fluency in natural speaking environments can be done by the clinician.

Conclusion

The study provides consensus guidelines on two different methods of stuttering severity assessment, first one using perceptual evaluation of stuttering severity and second one using computer. There was a strong linear correlation between subjective stuttering severity assessment done by the judges and stuttering severity scores calculated by the computer. The finding of this study suggests that the two measures can be regarded as interchangeable.

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Homogeneity in Popular Culture: AI and Representation of Hindu Deities in Social Media

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Abstract

This article explores how artificial intelligence (AI) and popular culture intersect within the Indian cultural context. It looks into how popular culture and AI technologies work together in cultural production, focusing on how creators intentionally and systematically design AI-based cultural content. This paper examines the impact of AI-integrated popular culture, especially regarding creativity and how such content is perceived by the uninitiated audience. A key aspect of this study is the role of aesthetics in shaping perception, which includes both everyday experiences and those connected to the arts in religious scenario. In popular culture, people can have aesthetic experiences in either or both areas, often trying to combine them into a single, meaningful experience. The study aims to open up new possibilities for understanding how art and digitally produced content come together in this process and how these different domains are increasingly interconnected. The paper tries to look into the limitations of such tools in generating images of Hindu deities and its blatantly obvious representation.

Keywords: Hindu Deities in Social Media, Artificial Intelligence (AI), AI-Generated Imagery, Cultural Representation, Cultural Stereotypes, AI Bias.

Introduction

The integration of artificial intelligence (AI) into popular culture is changing how cultural content is produced and represented in Indian visual media. It is significant now to assess

how AI and digital platforms come together in the Indian cultural setting which could probably offer insights into the way creative media get actively involved in generating AI-driven content. It is now an established fact that AI is a powerful force that is transforming modern society by changing how industries, economies, and everyday life function. AI expert Pedro Domingos describes AI as a broad area that includes technologies like machine learning, neural networks, and natural language processing, all aimed at giving machines human-like abilities.

According to Domingos, AI can revolutionize fields such as healthcare, finance, transport, and entertainment by automating tasks, analyzing large amounts of data, and making decisions on its own. However, he also warns about the ethical and social issues that AI raises, such as biased algorithms and the risk of job loss, stressing the importance of responsible AI use to ensure fair and positive outcomes for everyone (Domingos, 2015).

Cultural identity, on the other hand, involves a mix of beliefs, traditions, language, and customs that shape how individuals and communities see themselves and express who they are. Cultural theorist Stuart Hall explains that cultural identity is not fixed; instead, it changes over time through social interactions and historical events. It is influenced by shared histories, social contexts, and personal experiences. Cultural identity is also linked to power structures, as dominant cultural narratives influence how groups view themselves and how others see them. Understanding cultural identity requires acknowledging its complexity and the many perspectives that contribute to the diversity of human experience (Hall, 1990).

The meeting point of AI and cultural identity brings important questions for how technology develops and affects society. Hall's ideas help us understand how people form their identities within larger cultural systems. In the field of AI, cultural identity matters in how algorithms are designed and used, and in how people interpret the content produced by AI. Domingos emphasizes that cultural differences must be considered in data analysis and AI decisions to reduce bias and ensure fairness. As AI becomes more present in everyday life, it can either support existing cultural patterns or challenge them. This highlights the need for inclusive, culturally sensitive approaches in developing and applying AI technologies.

Literature Review

Several studies have already been published in this field and are worth highlighting. Christine L. Liao (2008) suggests that new media art goes beyond simply using digital tools and the internet. It combines artistic expression, technology, and human interaction, and is defined by features like digitality, interactivity, hypertextuality, dispersion, and virtuality. New media art is rooted in active participation and hybrid forms of creation.

Daniel Becker (2017) argues that forgeries reflect a systematic logic of perception, resembling how digital systems like AI function. While artists may use gaps or flaws creatively, forgeries aim to fill them in seamlessly. New media artworks discussed in the study reveal the processes behind forgeries, showing that both machines and AI follow programmed instructions. Unlike traditional forgeries, which try to hide their artificial nature, AI-generated content makes its structure visible. Whether something is seen as real or fake, or AI as authentic or deceptive, often depends on the viewer's expectations and interpretive framework.

Michele Elam (2022) emphasizes the importance of integrating AI more deeply with the humanities and the arts to promote human well-being, especially in the context of social justice. She argues that race, ethnicity, and gender should not be treated as fixed or commercialized data points, but rather as evolving social constructs influenced by political and power dynamics.

Todd C. Helmus (2022) explores the dangers posed by deepfakes and reviews strategies to reduce their risks. He also discusses ongoing efforts to detect and counteract them effectively.

Yan Zhao (2024) investigates how AI technology is shaping visual communication in new media art. The study introduces an AI-based approach to layout design using Convolutional Neural Networks (CNNs) and highlights how generative AI, through deep learning and big data analysis, can independently create design elements and structures—contributing to innovation in visual communication.

Yilin Ye and colleagues (2024) analyze how Generative AI (GenAI) is being rapidly adopted in visualization design. They review earlier work and outline major breakthroughs like diffusion models and large language models that have expanded GenAI's capabilities. The paper classifies GenAI applications into four stages: data enhancement, visual mapping, stylization, and interaction. It also evaluates various GenAI techniques—including sequence, tabular, spatial, and graph generation—by identifying their strengths and weaknesses.

V. Pandiyaraj, Dr. N. Raja, and Deeparajeswari (2024) examined how Indian identity is portrayed in AI-generated images, focusing on how cultural representation appears in technology-supported narratives. The present paper takes up their argument further.

Ionela Bara and collaborators (2025) explore how information about AI systems affects people's moral and aesthetic judgments. In the first experiment, participants rated AI-generated art as less morally acceptable and less aesthetically valuable when they were given details about how the AI worked—especially in situations involving money or artistic credit. In the second experiment, learning about an AI artwork's success didn't significantly affect moral judgments. The third experiment showed that people's unconscious associations between human- and AI-made art were mixed and did not always favor human-made works. Shaily (2025) in AI Generated Gods and Impacts on the Information Ecosystem writes about such concerns. She explores the impact of Generative AI on fragile information ecosystems—such as religion—that are open to broad interpretation, rely on limited or contested sources, and are often difficult for the general public to access or understand.

Background of Popular Art in Deity Representation

Figures and pictures of deities are common to the Hindu custom wherein realistic or symbolic representations are generally accepted for religious veneration. In the late 19th century, lithographic prints of deities gained popularity in India, initially influenced by European imports from Italy, Germany, and England. These prints depicted religious and secular themes and incorporated Western artistic styles. Punjab became an early site of intermingling between Eastern and Western art traditions, and by the 1870s, major lithographic presses were established in cities like Calcutta and Poona.

Raja Ravi Varma emerged as a key figure, blending European oil painting techniques with Indian religious iconography. In 1892, he founded the Ravi Varma Press, producing high-quality prints using German inks and meticulous lithographic methods. His works portrayed deities like Vishnu and Shiva in traditional South Indian attire, with naturalistic features and minimal ornamentation. Backgrounds often included symbolic and European elements. With the rise of nationalist movements and the decline of international trade during the world wars, India's domestic print industry expanded significantly. Over time, rising demand led to mass production, resulting in a decline in quality. The changeover from limestone lithography to metal etching reduced visual depth and detail, ultimately damaging Ravi Varma's critical reputation. Despite this, his prints played a pivotal role in shaping popular visual culture and religious representation in colonial and postcolonial India.

Methodology

This study focuses on visual materials and uses Stuart Hall's Encoding/Decoding Model (1973) to understand how media messages are produced, shared, and interpreted. According to Hall, media creators embed meanings in their messages, shaped by their cultural, political, and social contexts. However, audiences do not always interpret these messages in the same way. Their personal experiences, cultural background, and ideologies influence how they understand the content. This model highlights that communication is 'interactive' i.e., meaning is not simply passed from producer to receiver but is reshaped through interpretation.

When applied to AI-generated imagery and Indian cultural identity, the proposed concept helps us to analyse how cultural content is embedded by AI systems and how it is perceived by viewers. These visuals are based on datasets that carry cultural, historical, and artistic influences. It is quite logical that an AI that is trained mostly on Western data, it may not accurately reflect Indian culture. But when the training includes Indian-specific elements the output becomes more culturally aligned. Audience interpretation also varies. Some might accept these images as authentic (dominant or accepted reading), others may agree with parts but critique certain details (negotiated or 'via media' reading), and some may completely reject the portrayal as incorrect or stereotypical (oppositional or 'disapproved' reading).

This framework is useful in examining AI's role as a media creator and raises important questions about dataset diversity, training methods, and cultural accuracy. It pushes for more inclusive AI development that respects cultural nuance.

To explore this, the study uses content analysis to investigate how Indian culture appears in AI-generated visuals. The steps as suggested in the article by V. Pandiyaraj, Dr. N. Raja, and Deeparajeswari (2024) are followed here;

Item	Category	Description
1	Prompt Selection:	Prompts focusing on Indian cultural elements are selected to guide image generation.
2	Image Generation:	These prompts are input into Leonardo AI and Imagine AI, which create images based on advanced algorithms.
3	Data Collection:	The resulting images are collected systematically to form a dataset representing Indian culture across multiple themes.
4	Content Analysis:	Each image is reviewed and coded according to themes, helping to interpret how cultural elements are presented.
5	Data Analysis:	The analysis identifies visual patterns and cultural meanings, exploring how Indian identity is expressed in AI-generated art.

Discussion and Findings

AI now plays a major role in shaping cultural content. From recommending content to generating images, music, and scripts, AI is transforming how media is created and consumed

and in many ways perpetuated. Indian media is increasingly using AI to boost storytelling and visual appeal. While this makes production more efficient, it also changes how creativity is defined, raising questions about originality and authenticity. From the audience's view, AI content can shape how people engage with culture. While AI customizes content to suit different tastes, this also creates risks—such as cultural bias, privacy issues, and a possible loss of diversity in representation. Visually, AI also influences aesthetics and how people experience culture. Today's digital world blends everyday visual experiences with AI-generated art, deepfakes, and filters. This alters the perspective of how people see themselves and others. AI allows experimentation with new artistic forms, blurring the lines between tradition and digital innovation and sometimes ideological dimension of images become farfetched.

The study reveals the reasons behind AI's impact in Indian popular culture across media like AI-generated images in popular figures and Hindu deities.

The researcher suggests the readers to go directly to the website given to see some samples: (Please read the limitations also)
https://www.wisdomlib.org/hinduism/book/mahabharata-english-summary/d/doc1345145.html
https://www.wisdomlib.org/hinduism/book/mahabharata-english-summary/d/doc1345205.html
https://www.wisdomlib.org/hinduism/book/mahabharata-english-summary/d/doc1345215.html
https://www.wisdomlib.org/hinduism/book/mahabharata-english-summary/d/doc1345030.html

The examples show how AI affects cultural meaning and challenges traditional roles in media creation. Further, there are issues of standardization and creativity. A typical AI generated male divine figure has the same appearance with a well-built muscular body, long nose, fair skinned (not the European category) and an infant will have a chubby cherubic look with ornaments. As per the Hindu tradition, there is well preserved system of how a God or Goddess is visualised and each deity will have a special mantra system which enable the

devotee to internally conceive the image through the shloka. However, with art becoming a commodity, this opportunity is lost and there is a kind of standardisation. This will become all the more problematic with AI taking up the reins.

The study underscores the concerns like the homogenization of content, reduced creative variety, and machine-made visuals. As AI simplifies content creation, it may limit artistic uniqueness. The merging of AI and popular culture not only enables new forms of creative expression but also challenges traditional ideas about art and creativity. Moreover, the author/painter is now a prompt maker.

Conclusion

By analyzing visuals produced using AI tools the paper has attempted to understand how Hindu deities are represented. Images related to Hindu deities and cultural events often failed to reflect the full cultural richness of the religious and spiritual aspect. This highlights the limitations of AI in conveying the true sense of representation. These aspects point to the need for careful evaluation and improvement of AI tools and prompts. This paper is only a reminder that AI generated art, especially for religious purposed need to improve and they should represent diverse cultural identities, contributing to broader efforts in making this technology more culturally responsive and responsible rather than too predictable.

Study and Limitation

- The author accepts the fact that it is unfair to pick images from Web resources as it may lead to infringement of copy right. Further, the pamphlets received from temples at hand may bear resemblance with such web resources.
- Transparency: The author states that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
- Competing Interests: The author declares that he has no competing interests
- Acknowledgment is expressed to Wisdom Library maintained by Gabe Hiemstra the author of the website. (https://www.wisdomlib.org/)

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Localization Advantage for Indian Languages: A Brief Case Study of Tamil Trends

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Abstract

Considerable number of Indian languages and their users are making their presence felt on the world wide web, be it content generation, content communication, ecommerce exchanges etc. A KPMG report in 2017 brought the much needed focus on the formidable presence of Indian languages in the internet space. It threw light on the fledgling Indian language user base. The report was a revelation and tacitly called for awareness and development of necessary tools and websites with multilingual capabilities in the Indian scenario. There was a natural insistence on establishing standards and implementing localization prominently that appeared as postscripts to this proposition. The scenario we have today is much bigger than what had been imagined or predicted about ten years ago, thanks to COVID-19 pandemic. Lockdowns and work/study from home restrictions catapulted the Indian languages everywhere on the internet. Online retailers and OTT platforms grabbed the opportunities. Though the trends have always been visible on various frontiers, the role played by localisation has not been elaborately studied. This study, traces some of these trends in Indian languages, particularly Tamil, that have leveraged the devices and opportunities. I will jot the trajectory by multiple markers, especially, by some of the initiatives of the software giants which may give some insights into what lies in the future for Indian languages.

Keywords: localization, Indian languages, Tamil, internet, ICT

1. Introduction

‘We are in the middle of information era and change was disruptive and big…Future is coming sooner than anticipated’

- Prime Minister of India, quoted on *Digital India* website

The internet has become a route for achieving social and economic prospects for many nations. These countries aim at improving education, healthcare, banking, business opportunities, and communication using Information and Communication Technology (ICT). India as a nation has taken up e-governance as a potential tool for implementing its governmental schemes as well as improving the general standards of life. India launched the *Digital India* programme in 2015 with an aim to digitally empower the society and place the knowledge economy in an upward trajectory. Even before this, many private players had identified the Indian market as one their major focus areas not just for increasing their consumer base, but for expanding even their production base. The idea of 'the biggest democracy' caught up fast. Growing population, which was a concern for the government, was seen as an opportunity by the private companies.

The number of languages too, which has been considered as an impediment to development by some, was viewed by the private agencies as multiple paths and as new openings for reaching consumers. They considered it an efficient marketing strategy to use all the available options rather than making the public restrained to discomfort.

The private players did not have any restrictions like the Government which has different criteria like official languages, State languages, languages defined by populations or communities etc. For instance, when the Department of Electronics and Information Technology, Government of India starts developing a language tool, it has to make sure that the project covers all official languages. Any government schemes and projects through the Ministry of Education, GoI, like the National Translation Mission or the Bharatavani must consider all the 22 languages listed in the VIII Schedule of the Constitution of India first and then move to the other languages.

Whereas private players are free to approach languages according to user preferences, market perspectives etc. This is why quite a few languages, apart from the Scheduled Languages of India, find their places in the list of languages in some popular machine translators. Such a space gained by the Indian languages can be studied against different markers like localization strength of the languages, availability of standard digital tools like Unicode fonts, input and conversion software, parallel corpus and internet penetration etc.

1.1. Indian Languages Situation

'Localization has become the showcase market strategy of international capitalism.'

(Pym, 2005)

Indian languages have been vying for an enviable space on the world wide web. As noted, one of the advantages for the languages is the number of their speakers. The CIA factbook (2024) lists Hindi, Bengali and Urdu from the Subcontinent among the top 10 most-spoken languages of the world. Urdu and Bengali, while being used in India as well as neighbouring Pakistan and Bangladesh respectively, use the same script in both the countries whereas Punjabi (Western) listed among the top ten most-spoken mother tongues uses the Perso-Arabic script unlike the Punjabi from India which uses the Gurmukhi script.

Six of the top 25 languages spoken as first or second language in the early 2020s were languages from the Indian subcontinent according to Ethnologue (as reported in *Encyclopedia Britannica*). According to another list, seven of the top 25 most spoken languages by native population were Subcontinent languages. The numbers are enumerated in the following table:

Table 1 - Language situation by speakers - early 2020s

Language	No. of native speakers*	Rank	No. of total speakers[1]	Rank	L1 speaker (%)	L2 speaker (%)
Hindi	344.65	5	609.46	3	57	43
Bengali	233.81	7	272.83	7	86	14
Marathi	83.20	13	99.22	16	84	16
Telugu	82.97	14	95.98	17	86	14
Tamil	78.59	18	86.64	19	91	9
Urdu	70.56	20	231.72	10	30	70
Gujarati	57.08	24	-	-	-	

* All the population numbers in the table are given in millions.

While the rankings could have enthused any language enthusiast, the online presence of these languages, the focus of our study, was not very impressive at that time. One key observation for our study from this table would be the high percentage of second language speakers of

Hindi and Urdu listed in column 6. If we take here a position that L2 speakers would mostly identify themselves to be the consumers of a language and less as producers in that language, we can consider the L1 speakers as potential content creators of the language. The scenario that emerges is that the potential percentage of content producers is much higher in ratio for smaller languages in comparison with Hindi and Urdu. However, the ratio will hardly matter here as the number of both L1 and L2 population is quite high for Hindi and Urdu. Obviously, the two languages have a very high L2 population. The content here can include anything from Bollywood movies to product details appearing on an online aggregator/retailer portal to the government documents released everyday in these languages.

1.2. Literacy, Language Style and the Question of Content

Literacy in India was 73% in 2011 and could have reached the 75 mark in the 75th year of its independence, that is, in 2021. Those who were aged seven and above and could read and write with understanding in any language were considered literate. The people must both read and write to be counted as literate. However, India is a country where a huge population is still living in rural areas where university level education is yet to penetrate to satisfactory levels. Only 63% of the rural adult population were literate as against 83% of the urban adult population (Ministry of Statistics and Programme Implementation | Government of India, 2016). For 1000 persons only 18 females from rural India completed their graduation as against 96 from the urban regions. For the same 1000 persons, among the males, 37 from rural areas and 126 from the urban areas graduated successfully.

Given a combination of all these statistics, one can assume that not many of the L2 speakers would be able to handle the written material in both L1 and L2 fluently. Such learnings, does not matter if they were statistically driven or by popular opinion, seems to have influenced the type of content creation for Indian language users. This is also supported by global trends where audio-visual content gains more traction than textual content (Boston Consulting Group, 2018). Entertainment content is turning almost exclusively audio-visual and so are news and information. Over the top (OTT) platforms have grown equally to the television industry offering content on various subjects from entertainment, infotainment to religious sermons and activities. Product reviews use audio visual medium and so do the culinary content developers.

In education, audio-visual medium in the form of Massive Open Online Courses (MOOCs) is popular both as informal and formal modes of education. The Government of India has its own MOOCs in the form of the SWAYAM, NPTEL and e-Pathshala portals which are slowly but steadily augmenting content to the classroom teaching. While text does accompany these videos and examinations have to strictly follow the textual path, audio-visual content generation and publishing remains the core to the users. In certain platforms, some users post in different languages and their presence on the site is a combination of their posts in more than one language platform. For example, Balaji Viswanathan on Quora (https://www.quora.com/profile/Dr-Balaji-Viswanathan), the question answer social media portal, is the highest subscribed globally on the portal with over five million followers. He posts regularly in English as well as Tamil.

1.3. Diglossia and Content

The relationship of literacy with different content types becomes interesting in the case of Tamil as it is a diglossic language. Among the two varieties of Tamil, i.e., the informal and the formal, the former is used in everyday conversation. The latter, perhaps enhanced by formal education, is mostly textual and is also followed in formal oration or reporting in television/radio news broadcasts. While the two varieties show differences at all linguistic levels in Tamil, it may be noted that there are no two separate sets of lexical items in Tamil as exhibited by many other diglossic languages. The formal variety in Tamil includes all the words which find their space in the informal Tamil but has a few more which may occur only in the formal variety. Ramaswami (1997) points out that the formal variety has two styles. The pedantic style among the two is more formal than the popular style. The popular style uses the lexical items of informal Tamil but applies the phonology of the formal Tamil. Localization efforts generally prefer the popular style in print texts or online publications. From a cursory study done for this article on the Tamil version of the 'Google Terms of Service – Privacy & Terms' page (Google, 2024), this researcher found a mixture of lexical pairs from both the formal and the informal Tamil used in different places of the same article, for example, *agaRRu/niikku* 'remove/delete', *udaaranam/eDuttukkaaTTu* 'example', *kuuRu/sol* 'say/state', *aLi/koDu* 'provide', *evvaaRu/eppaDi* 'how' etc.

The YouTubers and social media influencers producing visual content, however, prefer the spoken variety. The choice of spoken variety also erases any inhibitions about code mixing or

using words having non-Tamil roots in their presentations. They choose a style which is reasonably without regional colours, unless otherwise their channel objectives or the content demands sticking to a particular regional variety. This style is viewed as suiting their content which is neither 'official' nor could be termed 'objective'.

2. The KPMG Report

One can say that the report by KPMG in India (2017) from the study done in collaboration with Google about the presence of Indian languages on the internet put the Indian language user on the map. The executive summary of the report started with the lines startling everyone that Indian language users have overtaken the number of English users in 2016. The number was growing fast at a rate of 18 percent CAGR (compound annual growth rate) and was predicted to reach 536 million by 2021. This startled the pundits as well as the common public together. The Government of India had already aimed at these prospects with the *Digital India* premise. All these attracted the attention of the multinationals to increase their footprint in Indian languages. Home delivery of daily essentials during the COVID-19 pandemic acted as a catalyst. Online retailers, transport and food delivery aggregators took advantage of the curbs on public movements. Many took to online banking, online classes etc willingly while others accepted the same for lack of options. All these increased the demand for making content and apps available in Indian languages and tech giants followed it up with their own projects.

3. Indian Language Initiatives by the Global and Local Technology Companies

The rise of ICT has been phenomenal in the last decade both in terms of content as well technology. A few of the initiatives began in the initial years of the last decade itself. Therefore, their success was not through any short cuts but through long thought out plans extending to the future. However, with the advent of artificial intelligence (AI) technology, especially, large language models (LLMs) and conversational generative AI (CGAI), many new players have entered the arena. Here we look at some long drawn projects to mark the trends in Indian languages on the internet.

3.1. Next Billion Users (NBU) from Google

Next Billion Users (NBU) initiative was launched by Google LLC in 2015 focusing on developing a better and easier internet for users who started accessing the internet for the first time. They were using their smartphones mostly to access the internet and using the

smartphone itself was a new experience for them (Ranjan, 2022). New banking apps, map apps etc. were created facilitating their various daily needs. The focus on India provided the language challenge. Interchangeable user language interfaces, multimodal accessibility through video and voice for searching content etc. took the center stage of software development (Anandan, 2018). These internet users were expected to be from lower income groups, with varying standards of education and even their connectivity to the internet was relatively unstable (O'Reilly, 2005). Google clubbed this NBU initiative with its localisation efforts. Many apps under its inventory like Google Play, Google Maps etc and a co-product like YouTube were localised greatly to attract the new users and facilitate their experience on the internet.

3.2. YouTube Scenario - 2025

The online video sharing platform YouTube.com is the second most visited website in the world and even in India. It was started in 2005 and Google LLC bought it in 2006. Unlike Google search engine which pulls pages from different websites and information from various databases based on the search queries from the users, YouTube search pulls videos from channels hosted on its own platform. About 15 channels in the top 50 YouTube channels were from India in 2023. In fact, an Indian music channel T-Series topped the list of YouTube subscribers in that year according to Kaggle.com statistics. While 14 of these channels were Hindi channels, Wave Music, ranked 33, was a Bhojpuri music channel. Apart from the music and film channels, one of these primarily posts children's educational content, another offered religious music and one more was a news and politics channel. The language of the channel is primarily identified as the language of the content here and not by the option of changing the interface in the particular language. However, opening up for the Indian market was long planned by the company. In 2016, Marc Lefkowitz, the then head of YouTube Content Creator Asia Pacific in an interview to an Indian business newspaper said that the company looked forward to increasing content in Indian languages by 40 percent by the next year (Chaturvedi, 2018). Many strategies were formed towards this. YouTube Music, for instance, created playlists in Indian languages according to various genres, actors, musicians etc of these languages. At present each Indian language has different scenarios in terms of top channels, content and the breed of YouTubers. It has given rise to new genres like stand-up comedy. Comedy is generally a top genre in social media and YouTube in particular. However, creating a space for artists who are not part of the film or TV industry which are the biggest sources of

comedy artists and let them become celebrities with their own standing is an achievement. YouTube influencers and motivational speakers are another tribe and product of the social media giant. In a language like Tamil, country life has got a new lease of life through channels about village cooking, natural farming etc. They are some of the most subscribed channels in the language.

3.3. The Wikipedia Scenario - 2020

Wikipedia, the voluntary crowdsourcing encyclopedia, is available in many languages. User participation in Wikipedia for creating and moderating the pages on different topics was a trendsetter which has been followed by many others later. Wikimedia Foundation runs this online encyclopedia and makes the content available under Creative Commons license. The Foundation complements Wikipedia with associative portals like Wikimedia, Wikimapia, Wiktionary etc. There is also a chat page to every page created where contributors converse about their choices, veracity of the information etc. The Foundation also organises workshops to engage language communities and potential contributors are trained through them. These efforts lead to better content generation. A Wiki Meta page provides information on the number of Wikipedia pages according to languages. Following is the ranking extracted by the end of 2022 which has been compared with the 2025 scenario:

Table 2 - Subcontinent Languages with 10,000+ Wikipedia Articles in 2022 and 2025

Language	**No. of articles (2022)**	**Rank (2022)**	**No. of articles (2025)**	**Rank (2025)**
English	6,562,386	1	6,971,551	1
Cebuano	6,125,564	2	6,116,768	2
Urdu	178,690	55	219,339	54
Hindi	153,338	59	165,278	63
Tamil	149,326	61	172,805	60
Bengali/Bangla	128,845	65	166,114	62
Marathi	87,483	74	99,626	74
Malayalam	79,564	78	86,685	82
Telugu	78,934	80	110,507	71
Newari	77,352	83	72,501	89

Western Punjabi	66,324	89	74,001	88
Punjabi	38,852	106	57,917	99
Nepali	32,130	109	29,907	117
Gujarati	29,997	111	30,534	116
Kannada	28,831	113	33,588	114
Bishnupriya Manipuri	25,085	117	25,087	125
Oriya/Odia	16,074	131	19,363	134
Sindhi	15,276	138	18,958	136
Maithili	13,720	145	14,192	150
Sanskrit	11,796	153	12,275	161
Assamese	10,777	158	17,660	138
Meitei	10,133	164	10,435	173
Sinhala	-	-	22,565	128
Santali	-	-	13,114	156

All the Subcontinent or Indian languages are ranked below 50 in the list both in 2022 and in 2025. Urdu and Hindi whose L1 and L2 speaker populations numbered 246 million and 609 million respectively were ranked 55 and 59 in 2022. While Urdu climbed to 54th spot in 2025, Hindi slipped to 63. Both of them had a little more than 1,50,000 articles as against English which had over 6,00,000 articles. In fact, no Asian language figures in the top 10 list except Cebuano, a language from the Philippines. The unusually high number of articles in Cebuano is attributed to the use of a bot and the articles were not naturally created by the users. It is interesting to note the place of Tamil in the list, which ranked 17 according to population and quite less in actual number of speakers compared to Hindi, yet took just two places below Hindi and four places below Urdu in the ranking for the number of Wikipedia articles. This achievement of Tamil is certainly remarkable, and it has to be studied to see if this can be replicated for other languages.

Comparing the Wiki Meta data about Wikipedia users of 2022 and 2025 one can also notice an incongruous factor that the number of active users has gone down from 311, 1389 and 349 in 2022 to 258, 973 and 315 in 2025 for Urdu, Hindi and Tamil respectively. On the surface, this seems to be in direct contrast with the KPMG (2017) report which predicted that more

Indian language users would become active users when the internet penetration increases. However, the criteria of active users is different in both cases. For Wikipedia, an active user is someone who has registered herself with Wikipedia and she should get involved in editing the Wiki pages at least once in 30 days.

3.4. Project Tiger

Wikimedia Foundation is proactive in creating the contributor base to its regional language versions. They conducted a writing contest in Indian languages called *Tiger Project.* This particular project was done in collaboration with Google. It was launched with an intent to fill areas where content was less in Wikipedia. (Wikimedia, 2018). The duration of the contest was three months. The results showed that most number of pages were created in Punjabi. 32 users created 1,320 pages followed by Tamil where 56 users participated and created 1,241 pages. However, the Tamil pages had 63,617 new page views against 10,926 of Punjabi. In fact, Bengali and Malayalam which had a mere 379 and 251 articles written respectively, far exceeded Punjabi under new page views criterion with 29,740 and 18,763 respectively. Hindi had 17 users creating 280 articles which received 11,819 new page views. It is interesting to note that the contest also included English where 7 users created 20 pages which had an overwhelming response of 85,296 new page views. The project gives us an insight into how the number of speakers, availability of tools etc may influence different internet language communities differently.

4. The Influence of the Social Media

WhatsApp, Facebook, Twitter, Instagram etc have certainly become inevitable sources of both entertainment and information in many Indian languages. They have helped many individuals to connect with their schoolmates, many community organisations to connect with their members, many companies to compel their workers to be available online even after the office hours etc. Students remain connected with their teachers even after school hours. The social media is credited with influencing the mass movement in 2017 for restoring the legal rights for conducting *jallikattu*, the South Indian equivalent of the Spanish matador, in Tamil Nadu (Sivaraman, 2024). As mentioned before, some of the little Davids, the individual YouTubers, have beaten many tech Goliaths already. The success of social media is attributed to cheap data charges, availability of technology in Indian languages etc.

5. Script and Tools

Computing tools and software arrived relatively late to Indian languages when compared with the European situation. The most used script on the internet is obviously Latin. Major languages of the world and the internet like English, Spanish etc use the Latin script. Hindi and a few other Indian languages like Bodo, Dogri, Maithili, Marathi, Nepali, Sanskrit, Santali and Sindhi use the Devanagari Script. The Government of India also has a policy to introduce writing in Devanagari in any language that has not been reduced to writing yet. The Sahitya Akademi, the National Body of Letters of India, recognises only Devanagari for a language like Konkani which is written in multiple scripts in different States of India. Each of the major Dravidian languages use their own scripts and occupy different code blocks and so do Assamese, Bengali, Gujarati, Odia, Punjabi etc. Some State Governments had their own departments developing fonts and input systems and tools for the State languages from pre-Unicode times. A few non-governmental organisations and many individuals too have continuously contributed towards software development in Indian languages.

The Unicode Consortium adopted the ISCII system developed by the Government of India (Sengupta & Mooney, 2019) for Indian languages. Microsoft in their Windows OS included the Inscript keyboard initially for Indian languages along with the phonetic keyboard layout for some. Later it also included other standard keyboard layouts available for some languages, e.g., Tamil99 keyboard layout developed by the Government of Tamil Nadu for Tamil. Rajendran (2006) provides an annotated list of most of the tools that were available till 2006 for Tamil, just around the time Unicode became popular for Indian languages. Such tools have come in handy in the use of these languages on the internet.

Of late, Gboard keyboards are available for Indian languages on Android smartphones and they also allow voice typing. The latter has become a real game changer in Indian languages. Many people use the voice typing facility even though they know the keyboard layouts and are comfortable with typing in these languages. Apart from typing, image to text and translation tools etc also allow the use of Indian languages in a big way.

On the other hand, deep learning techniques in machine learning have made it possible to create translation systems and other language tools even with smaller corpus. Conversational Generative AI has not left Indian languages far behind. Llama2 is the latest of the Large

Language Models released by Meta AI, the owners of Facebook, WhatsApp and Instagram. It has become a source for many open source AI initiatives and individual researches on Indian languages. Meta itself has embarked on a mega initiative called 'No Language Left Behind' (NLLB) for all world languages and the greatest advantage of it is that it is using the open source models (Costa-Jussà et al, 2022). This will be the trend for the future. All developments in language technology need to be inclusive and Indian languages are to be covered by most of them.

6. The Trends and Conclusion

It is now a fact that Indian languages thrive on both the internet as well as the artificial intelligence technology scenario. Large Language Models (LLMs) are being made available with Indian languages. Popular AI systems include Indian language translation, information retrieval etc. Both the public and private sectors are involved in these endeavours. It must be noted that though content creation in Indian languages aids these processes, the two are not well balanced. Many Indian languages lack full-fledged content creators. Indian language content creation has not become a full-scale remunerative profession except for some journalists and popular YouTubers.

At the same time, the number of content consumers are on the rise. This has led to publishing of translated content from English and other languages which are translated through either human or machine translators. The machine translated content mostly appears as on-the-fly translations. Some websites like www.amazon.in provide a user interface with human translated menus, buttons etc. However, their product details are mostly on-the-fly translations from their English content as they form a huge chunk considering the number of products that are available on their website. This leads to a confused state as far as user experience is concerned as these translations create many hallucinating moments. On the fly machine translations are also available on many service websites and other websites of the Government like www.cowin.gov.in, www.uidai.gov.in etc. While the space for Indian languages is increasing everyday on the internet, many do not seem to capitalise on the advantage yet.

Only big players like Google, Amazon, etc. and some individual YouTubers have reaped the best out of these available tools and consumer interest.

Some Indian languages with larger populations have not been able to convert that into increasing their presence on the internet. Content creation, therefore, seems to have been taken up in some languages, for instance Tamil, not because of the size of its population. It is not an effort to establish digital capitalilsm. It has been taken up because the language users seem to be language lovers in the first place. It is their love to see their language everywhere that seems to fuel the high rate of development of these languages on the internet. It is also aided by the available tools as seen in the Project Tiger case where more new page views were witnessed in the case of Tamil with comparatively fewer number of pages and users. One can only agree with A Ramasamy Gounder's statement in the December 1943 issue of *Tamil Pozhil* magazine (reported in Venkatachalapathy, 2000) who describes the phenomenon not as any hate towards any other language but as the love and passion for one's own language. This will be the crucial element for Indian languages to stay relevant in the digital future.

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Cross-Linguistic Differences in Stress Perception: A Study on Kannada, Telugu, and Malayalam Speakers

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Abstract

Stress perception plays a crucial role in speech processing, influencing language acquisition and communication. The study aims to explore how the phonetic and prosodic characteristics of these Dravidian languages affect listeners' ability to perceive stress patterns in Kannada, their non-native language. A controlled experimental design was done, involving 15 Kannada-speaking participants as the control group and 30 Telugu- and Malayalam-speaking participants as the experimental groups. Using a series of stress-marked two-word Kannada phrases, the participants' ability to perceive stress based on suprasegmental cues such as vowel duration, fundamental frequency (Fo), and intensity was evaluated. The results revealed significant differences in stress

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perception abilities among the groups. Native Kannada speakers achieved near-perfect scores of 100%, while Telugu speakers obtained a mean score of 56.88%, and Malayalam speakers performed the worst with a mean score of 42.5%. The findings indicate that Kannada speakers rely heavily on vowel duration for stress detection, whereas Telugu and Malayalam speakers, with more complex stress systems, show less efficiency in perceiving stress in Kannada. These results highlight the influence of native phonological systems on second language stress perception and suggest implications for language teaching and speech therapy, emphasizing the need to consider cross-linguistic influences in second language acquisition.

Keywords: Cross-linguistic differences, multilingualism stress perception, speech perception, suprasegmental cues and second language.

Introduction

Speech perception is the ability to interpret and understand spoken language by converting continuously changing acoustic signals into meaningful linguistic units [1]. It is a fundamental aspect of human communication, involving interactions between auditory processing, phonetics, phonology, and cognitive mechanisms. Effective speech perception is crucial for language acquisition, speech recognition, and verbal communication. Research in this area spans multiple disciplines, including psycholinguistics, neurophysiology, phonetics, and artificial intelligence. One key component of speech perception is phonological processing, which includes phonemic awareness, phonological recording in lexical access, and short-term verbal memory skills [2]. Language background significantly influences speech perception, particularly in stress pattern recognition and phonetic contrasts. Studies indicate that non-native speakers often struggle with perceiving and producing stress patterns due to differences in their native phonological systems [3-4]. Bilingual and multilingual individuals experience cross-linguistic influences, where the phonetic and prosodic characteristics of one language affect the perception and production of another. Stress perception varies across languages; for instance, English employs lexical stress, where stress placement changes word meaning (e.g., 'permit' as a noun vs. 'permit' as a verb), whereas languages like Bengali have fixed stress patterns and explored the role of acoustic cues

such as pitch, duration, and intensity in stress perception [5-6]. Telugu and Malayalam, two Dravidian languages, exhibit distinct phonetic and stress patterns. However, limited research has examined how native speakers of these languages perceive stress contrasts in a non-native language. Understanding these variations is essential for language learning, speech therapy, and auditory rehabilitation.

[7] Described Kannada stress as typically falling on the first syllable, while [8] characterized Telugu as a mora-timed system [9] further investigated Malayalam, demonstrating that stress placement depends on vowel length and syllable position. The Stress Deafness Model [10] suggests that speakers of fixed-stress languages struggle with stress contrasts in an L2. [11] Proposed the Stress Typology Model, which predicts varying difficulties based on L1 stress predictability. [12] Emphasized the influence of linguistic background and proficiency on stress perception. [13] Found that bilinguals show L1 influence on L2 stress perception, with more proficient bilinguals adapting better to L2 prosodic contrasts. [14] Revealed that Cantonese-English bilinguals outperformed native English speakers in lexical stress discrimination, suggesting an advantage from tone language experience. [15] Showed that phonetics training aids stress detection, particularly in bilinguals. [16] Demonstrated that adverse acoustic conditions increase listening effort, particularly for non-native listeners. [17] Examined bilinguals' ability to understand non-native speech, finding that they performed better than monolinguals but did not necessarily benefit from shared linguistic backgrounds. [18] Found that both native and non-native speakers adjust their speech for better intelligibility. [19] Concluded that Spanish speakers did not always transfer stress patterns to English. [20] Proposed the Native OPERA Hypothesis, suggesting that musicianship enhances stress discrimination. [21] Investigated word stress perception, highlighting that suprasegmental cues aid word recognition primarily in languages where they reduce lexical competition. [22] Explored foreign language anxiety, showing that younger and strict teachers increased student anxiety, whereas pedagogical skills enhanced enjoyment. [23] Emphasized the role of online learning in increasing language anxiety and proposed strategies to mitigate it. [24] Demonstrated that augmented reality with speech input enhances children's language learning. [25] Found that awareness of learning goals influenced

students' perceptions of teacher feedback. [26] Examined the relationship between multilingualism, well-being, and stress, concluding that higher subjective well-being and lower stress levels enhance language learning enjoyment. [27] Provided evidence that European Portuguese-learning infants as young as 5–6 months exhibit sensitivity to stress patterns, reinforcing the importance of early exposure to language-specific phonetic properties.

Kannada, a Dravidian language, primarily uses vowel duration as a key cue for stress perception, with stress typically falling on the first syllable. This means that the phonetic structure of Kannada encourages speakers to use vowel length as the primary cue for identifying stressed syllables. In contrast, Telugu, which follows a mora-timed system, relies on syllable length and vowel length for determining stress placement. This allows Telugu speakers to place stress on longer syllables or those containing long vowels. Malayalam, another Dravidian language, is more complex due to its multi-centric stress system, where stress can shift between syllables depending on factors such as syllable position and vowel length, resulting in both primary and secondary stress patterns.

Research on stress perception has demonstrated the influence of phonetic, phonological, and cognitive processes in recognizing speech sounds. While studies have examined various languages, there is a lack of research focusing on Telugu and Malayalam speakers' stress perception in an L2 context. This study aims to bridge that gap by analyzing how these speakers perceive and differentiate stress patterns, contributing to the broader understanding of bilingual speech perception.

Method

This study utilized a controlled experimental design to investigate the relationship between stress perception and duration cues in different native language groups. Participants were divided into control and experimental groups based on their linguistic backgrounds and audiological screening criteria.

Participants

The study included the following groups:

Control Group: Comprising 15 healthy, normal-hearing volunteers who were native Kannada speakers. All participants in this group passed a screening audiological evaluation.

Experimental Group: Divided into two subgroups:

Group 1: Normal-hearing adults with Telugu (15N) as their native language.

Group 2: Normal-hearing adults with Malayalam (15N) as their native language.

Age Range: The participants in both groups are aged between 25 and 35 years, with a mean age of 30 years (See table 1).

Table 1: Details of participants and audiological data across languages

Languages	**No. of Participants**	**Mean Age (yrs)**	**Mean Pure Tone Average (dBHL)**		**Speech Identification Scores (%)**	
			RE	**LE**	**RE**	**LE**
Telugu	15	30	15	15	100	100
Malayalam	15	30	16	16	98	98
Kannada	15	30	16	16	99	99

Inclusion Criteria

- Participants across all groups were required to meet the following inclusion criteria:
- No history or complaints of middle ear infections, tympanic membrane perforations, head trauma, noise exposure, or ear discharge.
- Pure-tone air and bone conduction thresholds below 15 dBHL at octave frequencies between 250 Hz and 8000 Hz, measured using the Modified Hughson and Westlake procedure [28].

- Speech recognition thresholds within +12 dB relative to the pure-tone average.
- Speech identification scores greater than 90% in both ears when presented at 40 dB SL (reference: SRT).
- Type "A/As" tympanogram with 226 Hz probe tone, with both ipsilateral and contralateral reflexes present at conventional test frequencies.
- No reported illnesses on the day of testing.

Procedure

All audiological tests and experiments were conducted in a well-ventilated, air-conditioned, sound-treated room with noise levels conforming to ANSI S3.1 (1996) standards.

Stimuli Preparation

- Twenty-eight meaningful two-word phrases from prior research [29] were selected. These phrases were produced with stress placed alternately on the first or second word, emphasizing duration cues.
- Recordings were made by a professional adult female Kannada speaker, skilled in modulating supra-segmental features like stress. The phrases were recorded using a 12-bit A/D converter with a 16000 Hz sampling frequency.
- All recordings were normalized for consistent intensity and divided into two lists. A calibration tone of 1 kHz was generated using Adobe Audition software and played before the test stimuli.

Audiological Testing

1. Pure-tone thresholds and speech identification scores were measured using a calibrated dual-channel Maico MA 42 diagnostic audiometer with TDH-39 headphones and MX-41/AR ear cushions. Bone conduction thresholds were assessed with a Radio Ear B-71 bone vibrator.

2. Speech identification scores were measured in quiet using open-set word lists developed by [30-31] for Kannada, Telugu, and Malayalam listeners, respectively, at a presentation level of 40 dB SL002E
3. Immittance testing (tympanometry and acoustic reflexes) was performed with a calibrated Maico MI 34 middle ear analyser using a 226 Hz probe tone. Reflexes were tested ipsilaterally and contralaterally at 500 Hz, 1 kHz, 2 kHz, and 4 kHz.

Testing Protocol

Stimuli were played using Adobe Audition software via an i3 core duo computer routed to the tape/auxiliary input of the audiometer. Phrases were presented through TDH-39 headphones at 40 dB SL.

Participants identified the stressed word in each phrase, and responses were recorded. A score of one was given for each correct response, while incorrect responses received a score of zero.

Data Analysis

The percentage of correct responses was calculated for all participants and subjected to statistical analysis to evaluate differences between groups and conditions.

Statistical Analysis

Tests such as Levene's test of equity, ANOVA and post hoc were done by using SPSS 20 software to evaluate the means, standard deviations, standard error, and significant differences.

Results

The results revealed significant differences in stress perception abilities among native and non-native listeners. Participants in the control group (native Kannada speakers) achieved a perfect mean score of 100%, demonstrating their ability to effectively use supra-segmental cues such as vowel duration, fundamental frequency (Fo), and intensity to perceive stress. In contrast, native

Telugu listeners obtained a mean score of 56.88 %, while native Malayalam listeners performed the lowest, with a mean score of 42.5 %. Statistical analysis revealed that the Levene's test of equity was administered and observed that the error variance of the dependent variable is equal across the groups [F (2, 93) = 24.2, p<0.001]. (See Table 2 and Figure 1).

Table 2: Shows the mean, SD and SE of stress perception across languages

Native Language	Mean	SD	SE of Mean
Telugu	56.88	18.4	2.59
Malayalam	42.5	17.41	2.59
Kannada	100	0	2.59

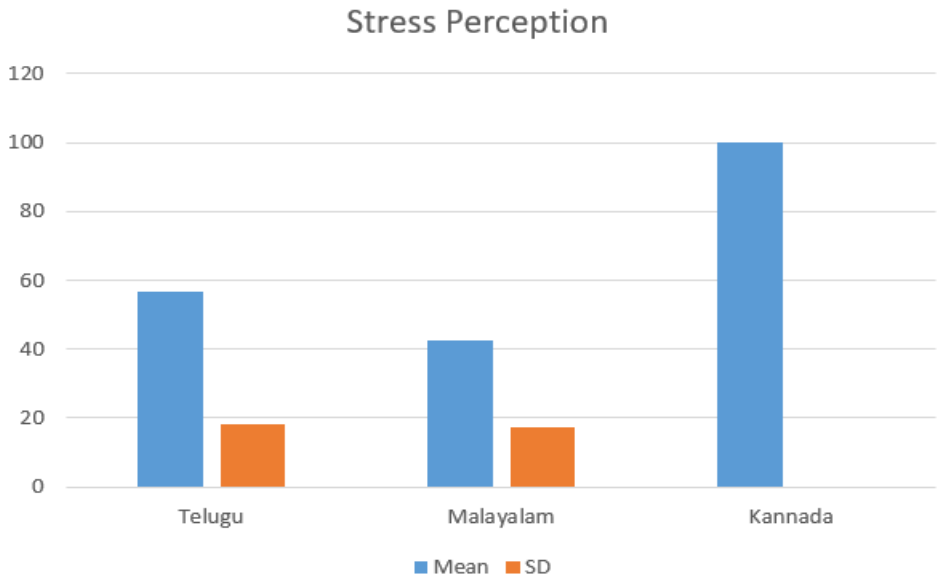

Fig 1: Shows the percentage of stress perception across languages

A one-way ANOVA showed a statistically significant difference in stress perception scores among the groups F(2,93)=133.99,p<0.001F(2,93) = 133.99, p < 0.001F(2,93)=133.99,p<0.001.

Post-hoc analysis using Bonferroni's multiple pairwise comparisons indicated that all groups significantly differed from one another.

The percentage of mean differences in stress perception scores between Telugu-Malayalam, Kannada-Malayalam, and Telugu-Kannada listeners were 14.38%, 57.5%, and 43.12%, respectively (see table 3 and Fig 2). These findings indicate that native Kannada listeners outperformed non-native listeners, while Telugu speakers had relatively better stress perception than Malayalam speakers.

Table 3: Shows percentage of mean difference (MD) between languages

Language Pair	MD Percentage (%)
Telugu-Malayalam	14.38
Kannada-Malayalam	57.5
Telugu-Kannada	43.12

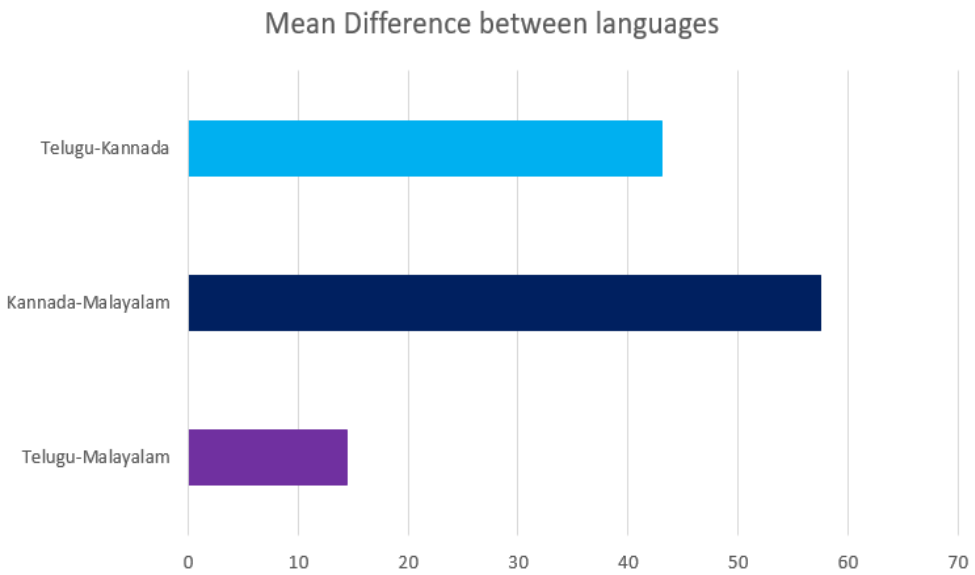

Fig 2: Shows the Mean Differences between languages

These findings suggest that non-native listeners performed considerably worse than native Kannada speakers, with the difference being more pronounced between Kannada and the other two languages than between Telugu and Malayalam. This aligns with previous research indicating that Kannada listeners rely heavily on vowel duration for stress perception, while Telugu listeners depend more on vowel length variations, and Malayalam listeners exhibit a multi-centric stress system with primary and secondary stress patterns. The lower scores of Malayalam listeners suggest that their reliance on multiple stress markers may have hindered their ability to perceive stress effectively in Kannada words. These results support the idea that stress perception is language-dependent and influenced by the phonetic characteristics of a listener's native language.

Discussion

Native Kannada speakers effectively utilized suprasegmental cues, with duration as the primary cue and Fo/intensity as secondary cues. Native Telugu speakers showed moderate stress perception abilities, primarily relying on vowel length for stress identification. Native Malayalam listeners exhibited the lowest performance, possibly due to the multi centric stress pattern in Malayalam, where primary and secondary stress components exist. The results align with past studies [29, 32] indicating that stress perception is largely language-dependent. Kannada speakers depend on vowel duration, while Telugu speakers focus on syllable length, and Malayalam speakers have a more complex stress pattern.

The results of the current study strongly suggest that cross-linguistic differences in stress perception are a result of the phonetic characteristics of each language. The perfect performance of native Kannada speakers can be attributed to their reliance on vowel duration, which is a prominent feature of their stress system. On the other hand, Telugu speakers showed moderate performance, possibly due to their focus on syllable length and vowel length, which shares some similarities with Kannada but is not as effective in perceiving stress contrasts in a second language. Malayalam speakers, who are accustomed to a more complex stress system that involves both primary and secondary stress, struggled more with Kannada stress, which is less varied and more predictable. These findings support the idea that stress perception is highly language-dependent

and influenced by a listener's native phonological system, as suggested by theories like the Stress Typology Model [11] and the Stress Deafness Model [10].

Conclusion

The findings of this study emphasize the importance of understanding cross-linguistic differences in stress perception. As demonstrated, native speakers of Kannada, Telugu, and Malayalam showed varying degrees of proficiency in perceiving stress in Kannada, a second language for all participants. Kannada speakers excelled due to their reliance on vowel duration, while Telugu speakers performed moderately well, owing to their reliance on syllable length and vowel length, which partially overlapped with Kannada's stress system. However, Malayalam speakers faced greater difficulty due to the multi-centric stress system in their language, which may have hindered their ability to accurately perceive Kannada stress. These differences suggest that language instructors and speech therapists should consider a learner's native language stress patterns when developing teaching strategies or therapies for second language acquisition or stress perception training.

Authors of the current study concluded that the stress perception varies significantly among Kannada, Telugu, and Malayalam speakers, highlighting the impact of native language phonetics on stress recognition in a second language.

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Conflicts of interests

NO

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Mathematical Modeling of the Optional Forms Generated by the *Krādi-niyama*

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Abstract

Panini, in his *Aṣṭādhyāyī*, tries to capture the usage of the then-spoken language, i.e., *bhāṣā*, in a highly concise manner. The treatise has nearly 3700 *sūtra*-s. Mathematical modeling implies providing a mathematical description of a system or a process of translating a problem into a mathematical format, i.e., with the help of mathematical symbols and mathematical language. Several works have highlighted the similarity between the P's *sūtra* and a mathematical function. Aggarwal & Kulkarni (2020) made a point by modeling the *pratyaya*-s in Sanskrit through functions with the help of Pāṇini's *sūtra*-s. The work remodeled the optional forms using the multi-valued function. We take the effort ahead by presenting the optional forms generated by the *Krādi*-niyama, specifically when added with *pratyaya thal* in the format of a multi-valued function. The present work focuses on the set of four *sūtra*-s from the A viz. A 7.2.13, 61, 62, and 63. It studies the collective understanding drawn out of the four *sūtra*-s by the commentary of *Vaiyākaraṇa-siddhānta-kaumudī*, known as *Krādi-niyama-kārikā*. We have remodeled the optional forms by studying the specific instances and developing verbal roots data sets. Currently, we have covered a group of 38 *aniṭ* verbal roots.

Mathematical modeling will help develop a more profound understanding of language and grammar. This is a sincere effort to preserve the grammatical data in newer and modern technical formats and an attempt to transfer the available data to a format accessible to learners outside the field.

Keywords: optional forms, *krādi-niyama*, multi-valued function, mathematical modeling, *aṣṭādhyāyī*, *pāṇinian* grammar

Introduction

Pāṇini (P), in his Aṣṭādhyāyī (A), tries to capture the usage of then-spoken language, i.e., *bhāṣā* in a highly concise *sūtra* format. Components of these *sūtra*-s are identical to the elements of a mathematical function. In a sense, a root word acts as an input (e.g., *dhātu*), the derivational process (e.g., substitution, sandhi, etc.) serves as the relationship to generate an output, i.e., a *pada*.[1] Thus, there seems to be a systemic similarity between the processing in P's *sūtra*-s and the mathematical functions. This similarity forces us to compare a *sūtra* with a mathematical function and further seek to remodel the *sūtra* or grammatical data in a mathematical or functional format.

Literature Review

A is a formal representation of grammar and a very brilliant one (Mishra, 2019). The introduction of A outside the Sanskrit sphere attracted curiosity towards its technical nature. Modern linguistics acknowledges it as the most complete generative grammar of any language yet written and continues to adopt technical ideas from it (Kiparsky, 1994). Efforts to discuss the similarities between P and modern computation can be traced back to 1967 when P. Z. Ingerman (1967) argued that the Backus-Naur Form could rightly be called the 'Pāṇini-Backus Form'. Further, J. Kadvany (2015), in his article 'Pāṇinian Grammar and Modern Computation' ponders upon the formalism brought out by P and its implications. Shyamsundar (2021) immaculately sums up the work done in this area. This shows that the mathematical nature of P's grammar influenced modern computation thought. On the other hand, it would not be incorrect to say that modern computation and linguistics have too

[1] The *sūtra*-s look for the preconditions in an input environment. The effects produced by *sūtra*-s become part of an ever-evolving environment that may trigger others. (Sohoni & Kulkarni, 2018)

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impacted the approach of Pāṇinian studies. Petersen (2004) intends to explain a grammatical phenomenon (structuring of the *śivasūtra*-s) using mathematical methods.

The development of Morphological analyzers by the University of Hyderabad paved the way for the application of P's grammar to computational systems. P's grammar has employed nuanced tools and techniques. To understand a rule and derivation one must decipher these techniques. Thus, there is a need for arranging grammatical data in newer and modern technical formats, expanding its access to experts outside the Sanskrit sphere (Kulkarni A. & Shukla, 2009). It is in this context we try to represent the grammatical data in non-verbal format i.e., using the language of mathematics[2]. This mathematical modeling aims to present the processes in P's grammar in a simplified and consistent manner.

Inspiration for the idea can be found in the work of Sohoni & Kulkarni (2018) which highlighted the structural similarity between P's rules and mathematical functions and proposed a system. Further, a precursor for the current thought is given by Aggarwal A. & Kulkarni (2020) in their article named 'Treatment of optional forms in Mathematical modeling of Pāṇini' and a thesis by Aggrawal A. (2021) focusing on writing the multi-valued functions denoted by words *vā*, *vibhāṣā* and *anyatarasyām*. We wish to take this work ahead by extending it to the multiple outputs resulting from mechanisms other than the one mentioned above, namely the mention of the sage expressing optionality.

We have focused on understanding the *Krādi-niyama* and modeling the derivation process of verbal roots when added with the suffix *thal*. The combination sometimes gives two or more than two outputs, termed as optional/variable forms. We represent the derivation using a multi-valued function.

Multi-valued Function in A

[2] A modeling language serves the need to pass data and a mathematical model description to a solver in the same way that people, especially mathematicians, describe those problems to each other (Kallrath 2013).

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To understand a multi-valued function, one must first understand what is a single-valued function. The single-valued function is a function that assumes one distinct value as its output. This can be explained as - f (x) = a, where f is the function, x is the input value, and a is the output obtained. Whereas a multi-valued function gives two or more values for the same input. This can be explained as, $f(y) = \begin{cases} a1 \\ a2 \\ a3 \end{cases}$. Here, *f* is the function, y is the input value, and a1, a2, a3 are outputs.

Expression of Optionality by P

Along with use of words *vā*, *vibhāṣā* and *anyatarasyām* mention of other linguists in rule is also perceived as expressing optionality by the tradition. For instance, A 1.1.16 – *sambuddhau śākalyasyetāvanārṣe* । (The final *o* of the vocative singular, before the word *iti* is *pragṛhya* in non-vedic literature, according to sage *śākalya*). According to others it is not *pragṛhya*.

As a result, we have two options of combining word *viṣṇo* with *iti*. One by application of term *pragṛhya*, leading to *prakṛtibhāva* (no change) due to A 6.1.125. Secondly, by not applying the term *pragṛhya*. This creates an environment for application of A 6.1.72 and generates an output – *viṣṇav iti*. Output at this stage becomes input for A 8.3.19, which again mentions option in the name of sage *śākalya*. Thus, by substituting zero (*lopa*) at the place of final *v*, we get *viṣṇa iti*. Optionally, by non-substitution of zero (without *lopa*) we have final v retained - *viṣṇav iti* → *viṣṇaviti*. So, we have three outputs for one input (Fig. 1):

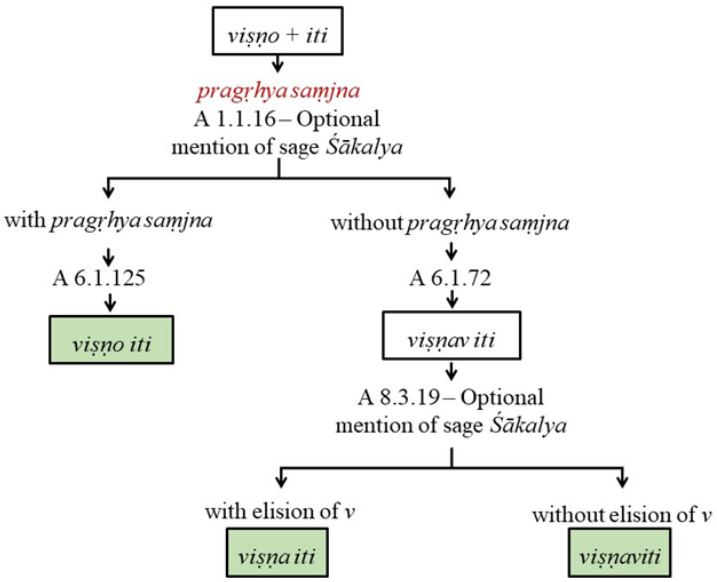

Fig. 1 Expression of optionality by P

P has mentioned 10 linguists by their names specifically – *Āpiśāli*, *Kāśyapa*, *Gārgya*, *Gālava*, *Cākravarmaṇa*, *Bhāradvāja*, *Śākaṭāyana*, *Śākalya*, *Senaka* and *Sphoṭāyana*. There are three references to other grammatical traditions or schools by words - *ācāryāṇām*, *udicām*, *prācām*. One reference is made, which remains unidentified as *eke*.

Traditional scholars have questioned the purpose behind mentioning these grammarians. It is argued that P refers to older authorities whenever he wants to suggest an option for a particular grammatical phenomenon (Bhate, 1970) – *vikalpārtham* (literally, for optional application). However, sometimes it is to show reverence to the predecessors – *pūjārtham* (literally, for reverence).

The total number of references made to linguists is 36. Out of this 19 times, the name is referred to as optionality and 17 times as respect to the predecessor. A 7.2.63 is one such instance where the name of the linguist viz. *Bhāradvāja* is used to express optional application of two previous rules A 7.2.61 and 62. Hence, we have two verbal forms for a single verbal root. Multi-valued function is a way to treat such optional forms.

The *Krādi-niyama*

Niyama is a restrictive rule or a restatement. The restriction or restatement is concerning the previous rule. *Krādi-niyama* comprises four rules from the A – 7.2.13, 61, 62, and 63. A 7.2.10[3] is a negation, which states that verbal roots having only one vowel and *prayogasamavāyī* vowel marked with *anudātta* accent in the initial enunciation are *aniṭ*[4] (without augment *iṭ*), when an *ārdhadhātuka* suffix, beginning with a consonant except for y (viz. *thal, va, ma, se, dhve, vahe, mahe*) follows. So, an *aniṭ* verbal root is never augmented with *iṭ*. A 7.2.13[5] reinstates that only *kṛ, sṛ, bhṛ, vṛ, stu, dru, sru,* and *śru* are not augmented with *iṭ*, in the *Liṭlakāra*. This implies that all other *aniṭ* verbal roots are augmented with *iṭ* in the *Liṭ-lakāra*. A 7.2.61[6] and 62[7] again restrict A 7.2.13 for a small portion – 1. *aniṭ* verbal roots ending in a vowel and 2. *aniṭ* verbal roots having *a* and ending in a consonant, specifically in the case of suffix *thal*. Thus, all other categories of *aniṭ* verbal roots are necessarily augmented with *iṭ* in the *Liṭ-lakāra*. Moreover, the above two types of *aniṭ* verbal roots also have augmentation of *iṭ* for suffixes other than *thal* (viz. *va, ma, se, dhve, vahe, mahe*). Further, A 7.2.63[8] mentions that *aniṭ* verbal roots ending in short *ṛ* are not augmented with *iṭ* when *thal* follows, according to *Bhāradvāja*. Mention of a linguist expresses an optional application of A 7.2.61 and 63. Hence, we have optional augmentation of *iṭ* when thal follows for *aniṭ* verbal roots ending in a vowel and having *a*. Both P and *Bhāradvāja* observe that *aniṭ* verbal roots ending in short *ṛ* are not augmented with *iṭ*.

This is one of the unique instances where negation of negated is implied resulting in a positive statement ultimately. The technique used by P creates complexity. Thus, VSK rearranges the rules[9] and notes collective meaning in the form of a verse known as *Krādi-niyama-kārikā* –

ajanto'kāravānvā yastāsyaniṭ thali veḍayam।

---

[3] *ekāca upadeśe'nudāttāt* । – A 7.2.10

[4] On the other hand, verbal roots having two or more ac (vowels) and a *prayogasamavāyī* vowel marked with *udātta* accent in the initial enunciation (*dhātupāṭha*) are *seṭ* (with augment *iṭ*).

[5] *kṛ-sṛ-bhṛ-vṛ-stu-dru-sru-śruvo liṭi* । - The personal endings of the *liṭ* do not get the augment *iṭ* after *kṛ, sṛ, bhṛ, vṛ, stu, dru, sru* and *śru*.

[6] *acastāsvatthalyaniṭo nityam* । - Suffix thal does not also get the augment *iṭ*, after a verbal root which ends in a vowel and which is always devoid of the *iṭ* augment after the Periphrastic Future affix *tāsi*.

[7] *upadeśe'tvataḥ* । - Suffix *thal* does not get the augment *iṭ*, after a verbal root which possesses a short a as its root-vowel in the *dhātupāṭha* and after which the Periphrastic Future *tās* is always devoid of the augment *iṭ*.

[8] *ṛto bhāradvājasya* । - In the opinion of *Bhāradvāja*, suffix *thal* does not get the augment *iṭ* only after a root which ends in short *ṛ* and after which the Periphrastic Future *tās* is always devoid of the augment *iṭ*.

[9] See 2293, 94, 95 and 96 in VSK

ṛdanta īdṛṅ nityāniṭ krādyanyo liṭi seḍ bhavet ॥ - VSK on 2296

Meaning - That verbal root which ends in *ac* (vowel) or which has *a* in the *dhātupāṭha* and which is *aniṭ* when added with suffix *tās*, is optionally *seṭ*, before suffix *thal*. But if such root ends in short *ṛ*, it is invariably *aniṭ* before the suffix *thal*. Roots other than that are *seṭ* in *Liṭ-lakāra*.

Thus, there are three categories of *aniṭ* verbal roots when it comes to suffix *thal* –

(i) Optional augmentation of *iṭ* – Verbal roots ending in *ac* (vowel) or having *a* in the *dhātupāṭha*

(ii) Without augmentation of *iṭ* – Verbal roots ending in short *ṛ*

(iii) Always with augmentation *iṭ* – All other verbal roots

Meaning of suffix *thal*

The verbal endings (*tiṅ*) in Sanskrit are divided into two categories - *parasmaipada* and *ātmanepada*. These *tiṅ* suffixes are added after a verbal root[10]. *Tiṅ* suffix or function takes *dhātu* (verbal root) as its input and gives *kriyāpada* (verb) as its output. In technical terms this output is called a *pada*[11]. In layman's term *pada* is a verbal utterance which can be used in a sentence.

In *parasmaipada*, the suffix *sip* is added to the verbal root expressing an agent (i.e., Active Voice). Suffix *sip* is used in the sense of IInd Person, and Singular is substituted by *thal* in the *Liṭ-lakāra* (Past Perfect or Pluperfect tense). Just as any other *tiṅ* suffix, *thal* also depicts four meanings – 1. *vācya* (voice) - *kartṛvācya* (active), 2. *kāla* (tense) - *bhūtakāla* (Past Perfect Tense), 3. *puruṣa* (person) - *madhyama* (IInd) and 4. *vacana* (number) - *ekavacana* (Singular). One must remember that these senses are in addition to the action expressed by a verbal root to which the suffix is added. For example, *tvaṃ cikretha* or *cikrayitha* । - You had bought.

Methodology & Notation

[10] *dhātoḥ* । - A 3.1.91

[11] *suptiṅantaṃ padam* । - A 1.4.14

We try to remodel the data produced by *krādi-niyama-kārikā* for which we referred to the list of *aniṭ* verbal roots (*aniṭkārikās*) by the VSK. Verbal roots (ending in a consonant) having vowel *a* and ending in a vowel other than the ones mentioned in *aniṭkārikās*[12] were noted, and forms were studied with the help VSK (Sathe, 1968), *bṛhaddhātukusumākara* by Harekant Mishra (1999), *Iḍāgamaḥ* by Pushpa Dikshit (Dikshit, 2010) and Verb-form generator available at sanskrit.uohyd.ac.in (Kulkarni A., 2002-22). Out of 167 *aniṭ* verbal roots ending in a vowel, 109 have optional augmentation of *iṭ*. One must note that the verbal root *vī* substituted in the place of the verbal root *aj*[13] also ends in a vowel. So, they are a total of 110 in number. We have selected 7 sample verbal roots for representation. These 7 verbal roots form Set-1. Set-2 consists of 31 verbal roots ending in a consonant and having vowel *a*. We noted down the derivative process of these 38 verbal roots dictated by P's rules in detail and tried to reproduce the stages in mathematical format (See Appendix). Verbal roots having the exact same derivation are grouped together under one set. In mathematical representation, we note the verbal roots or suffixes without *anubandhas*[14]. *Anubandhas* do play an important role in P's grammatical system but are not mentioned here, considering the ease of writing an equation. E.g., *i* for *iṭ*, *tha* for *thal*.

The mathematical representation method adopted here was proposed by Aggarwal & Kulkarni (2020). The work served as the terminus a quo for us. The following are the notations –

Symbol	**Represents**
X	Input (a verbal root here in this case)
€	Is an element of - x € A
F	Function (suffix to be added i.e., *thal*)
{}	Set with element – {a, b, c}
→	Converts to
[]	Conversion or step in the equation
c'	Consonant
v'	Vowel

[12] VSK on rule A 7.1.5
[13] *ajervyaghañapoḥ* । - A 2.4.56
14 A 1.3.2 - 9

Ø	Zero
≠	Not equals to
W	String or the unit
Any number, e.g., 1	Position of the operation from left to right
Number with horizontal bar, e.g., $\bar{2}$	Position of the operation from right to left
'+' operator	*sandhi* and then *saṃhitā*

Table 1: Notations

While noting the conversion, each syllable in the verbal root is counted separately. Suppose x= *śak*, the first syllable is ś, the second is "*a*", and the third is "*k"*.

Pre-requisites

Saṃhitā (proximity between the words) is presumed here. Two elements viz. *prakṛti* (herein *dhātu*) and *pratyaya* (suffix) are always in close proximity with each other. At the stage of *saṃhitā*, a vowel which follows a consonant is invariably combined with the it and both are written together. For example, *k + i = ki, n + i = ni, v + i = vi, gl + i = gli*, etc. Same is the case with conjunct-consonants. Consonants coming after one another (without any obstacle of vowel) are to be combined with each other. For example, *k + tha = ktha, d + dha = ddha, ṅ +k + tha = ṅktha, n + tha = ntha, p + tha = ptha*, etc.

Saṃhitā is a pre-condition for *sandhi* [15] (euphonic combination). We have here focused on modeling of the *krādi-niyama-kārikā* only; thus, we will not be dealing with modeling of the *sandhi niyama-s*. Although, we cognize that *sandhi* is an integral part of the derivation process, without which the elements kept together will not be united in true sense and will not be called *pada*. Hence, we are giving a list of *sandhi* cases we have observed through the examples –

e + i = ayi *o + i = avi*

m + tha = ntha *c / j + tha = ktha* *d + tha = ttha*

dh + tha = ddha *bh + tha = bdha* *ñj / sj / snj + tha = ṅktha*

15 *saṃhitāyām* । - A 6.1.72

ś / ṣ / cch / sj + tha = ṣṭha

The cases for specific verbal roots -

vah - uvah + tha = uvoḍha

nah - nanah + tha = nanaddha

dah - dadah + tha = dadagdha

This is not an exhaustive list of instances where the '+' operator can be used in Sanskrit; newer instances can be added as we study more data. It is to be noted that the '+' operator is used for denoting both – *saṃhitā* (close proximity[16]) and *sandhi* (close proximity resulting in a euphonic combination).

Multi-valued Function for Suffix *thal*

We here attempt to present the multi-valued function for the first category of *aniṭ* verbal roots when followed by the suffix *thal*. Each condition is considered a separate set. Hence, we will be dealing with two sets of *aniṭ* verbal roots –

(i) *aniṭ* verbal roots ending in a vowel - *krī, glai (glā), ci, dā, nī, vī, hu*

(ii) *aniṭ* verbal roots ending in a consonant and having vowel *a* - *ad, gam, tap, tyaj, dah, daṃś, nam, nah, pac, pracch, bhaj, bhañj, bhrasj (bhrajj), masj (majj), yaj, yabh, yam, rañj, vac, vap, vas, vah, vyadh, śak, śad, śap, sad, sanṃj, skand, svap, han*

Now, let us look at the mathematical modeling of the same using the multi-valued function. Let A be a set of *aniṭ* verbal roots ending in a vowel except for *ṛ*, A = (*ci, nī, vī, krī, hu, dā, glai*[17]). Here, the first branch of the equation describes representation without augmentation of *iṭ (i).* The second branch of the equation denotes representation with augment *iṭ*.

(a) Aniṭ verbal roots ending in a vowel

(i) Case I – ending in *i*

If x € { *ci* }, then

16 This can be compared with concatenation – a technical term in programming languages used for combining a string, text, or other data in a series, without any gaps.

17 Here after noted as *glā* – A 6.1.45

$$thal\ (\mathrm{x}) = \begin{cases} ci + ci\left[i \xrightarrow{\bar{1}} e\right] + tha \\ ci + ci\left[i \xrightarrow{\bar{1}} e\right] + i + tha \\ ci + ci\left[c \to k\right]\left[i \xrightarrow{\bar{1}} e\right] + tha \\ ci + ci\left[c \to k\right]\left[i \xrightarrow{\bar{1}} e\right] + i + tha \end{cases}$$

ci	*ci*	$ci\left[i \xrightarrow{\bar{1}} e\right]$	+	*thal* (x)
	ci	*ce*	*ci+ce+tha*	*cicetha*
	ci	*ce*	*ci+ce+i+tha*	*cicayitha*
	ci	$ci\left[c \to k\right]\left[i \xrightarrow{\bar{1}} e\right]$	+	*thal* (x)
	ci	*ke*	*ci+ke+tha*	*ciketha*
	ci	*ke*	*ci+ke+i+tha*	*cikayitha*

Table 2: Verbal root *ci*

(ii) Case II – ending in *ī*

If x ∈ {*nī*}, then

$$thal\ (\mathrm{x}) = \begin{cases} n\bar{\imath}\left[\bar{\imath} \to i\right] + n\bar{\imath}\left[i \xrightarrow{\bar{1}} e\right] + tha \\ n\bar{\imath}\left[\bar{\imath} \to i\right] + n\bar{\imath}\left[i \xrightarrow{\bar{1}} e\right] + i + tha \end{cases}$$

nī	$n\bar{\imath}\left[\bar{\imath} \to i\right]$	$n\bar{\imath}\left[i \xrightarrow{\bar{1}} e\right]$	+	*thal* (x)
	ni	*ne*	*ni+ne+tha*	*ninetha*
	ni	*ne*	*ni+ne+i+tha*	*ninayitha*

Table 3: Verbal roots *nī, vī*

Similarly, *thal* (*vi*) = *vivetha, vivayitha*

(iii) Case III - ending in *ī* and having consonant cluster

If x ∈ {*krī*}, then

$$thal\ (\mathrm{x}) = \begin{cases} kr\bar{\imath}\left[\bar{\imath} \to i\right]\left[c' \xrightarrow{\neq 1} \emptyset\right]\left[k \to c\right] + kr\bar{\imath}\left[i \xrightarrow{\bar{1}} e\right] + tha \\ kr\bar{\imath}\left[\bar{\imath} \to i\right]\left[c' \xrightarrow{\neq 1} \emptyset\right]\left[k \to c\right] + kr\bar{\imath}\left[i \xrightarrow{\bar{1}} e\right] + i + tha \end{cases}$$

krī	$krī\left[ī \to i\right]\left[c' \overset{\neq 1}{\to} \emptyset\right]\left[k \to c\right]$	$krī\left[i \overset{1}{\to} e\right]$	+	*thal* (x)
	ci	*kre*	*ci+kre+tha*	*cikretha*
	ci	*kre*	*ci+kre+i+tha*	*cikrayitha*

Table 4: Verbal root *krī*

(iv) Case IV - ending in *u*

If x ∈ $\{hu\}$, then

$$thal\ (\mathrm{x}) = \begin{cases} hu\left[h \to jh\right]\left[jh \to j\right] + hu\left[u \overset{1}{\to} o\right] + tha \\ hu\left[h \to jh\right]\left[jh \to j\right] + hu\left[u \overset{1}{\to} o\right] + i + tha \end{cases}$$

hu	$hu\left[h \to jh\right]\left[jh \to j\right]$	$hu\left[u \overset{1}{\to} o\right]$	+	*thal* (x)
	ju	*ho*	*ju+ho+tha*	*juhotha*
	ju	*ho*	*ju+ho+i+tha*	*juhavitha*

Table 5: verbal root *hu*

(v) Case V - ending in *ā*

If x ∈ $\{dā\}$, then

$$thal\ (\mathrm{x}) = \begin{cases} dā\left[ā \to a\right] + dā + tha \\ dā\left[ā \to a\right] + dā\left[ā \to \emptyset\right] + i + tha \end{cases}$$

dā	$dā\left[ā \to a\right]$	*dā*	+	*thal* (x)
	da	*dā*	*da+dā+tha*	*dadātha*
	$dā\left[ā \to a\right]$	$dā\left[ā \to \emptyset\right]$	+	*thal* (x)
	da	*d*	*da+d+i+tha*	*daditha*

Table 6: Verbal root *dā*

(vi) Case VI -

If x ∈ {*glā*}, then

$$thal\ (x) = \begin{cases} gl\bar{a}\left[\bar{a} \to a\right]\left[c' \overset{\neq 1}{\to} \emptyset\right]\left[g \to j\right] + gl\bar{a} + tha \\ gl\bar{a}\left[\bar{a} \to \bar{a}\right]\left[c' \overset{\neq 1}{\to} \emptyset\right]\left[g \to j\right] + gl\bar{a}\left[\bar{a} \to \emptyset\right] + i + tha \end{cases}$$

glā	$gl\bar{a}\left[\bar{a} \to a\right]\left[c' \overset{\neq 1}{\to} \emptyset\right]\left[g \to j\right]$	*glā*	+	*thal* (x)
	ja	*glā*	*ja+glā+tha*	*jaglātha*
	$gl\bar{a}\left[\bar{a} \to a\right]\left[c' \overset{\neq 1}{\to} \emptyset\right]\left[g \to j\right]$	$gl\bar{a}\left[\bar{a} \to \emptyset\right]$	+	*thal* (x)
	ja	*gl*	*ja+gl+i+tha*	*jaglitha*

Table 7: Verbal root *glā*

(b) Aniṭ verbal roots ending in a consonant

(i) Case I –

If x ∈ {*gam*}, then

$$thal\ (\mathrm{x}) = \begin{cases} gam\left[c' \overset{\neq 1}{\to} \emptyset\right]\left[g \to j\right] + gam + tha \\ gam\left[c' \overset{\neq 1}{\to} \emptyset\right]\left[g \to j\right] + gam + i + tha \end{cases}$$

gam	$gam\left[\mathrm{C} \overset{\neq 1}{\to} \emptyset\right]\left[g \to j\right]$	*gam*	+	*thal* (x)
	ja	*gam*	*ja+gam+tha*	*jagantha*
	ja	*gam*	*ja+gam+i+tha*	*jagamitha*

Table 8: Verbal root *gam*

(ii) Case II -

If x ∈ {*nam*}, then

$$thal\ (\mathrm{x}) = \begin{cases} nam\left[c' \overset{\neq 1}{\to} \emptyset\right] + nam + tha \\ nam\left[c' \overset{\neq 1}{\to} \emptyset\right]\left[\mathrm{W} \overset{1}{\to} \emptyset\right] + nam\left[a \overset{5}{\to} e\right] + i + tha \end{cases}$$

nam	$nam\left[c' \overset{\neq 1}{\to} \emptyset\right]$	*nam*	+	*thal* (x)

	na	*nam*	*na+nam+tha*	*nanantha*
	$nam\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[\mathrm{W} \rightarrow \emptyset\right]$	$nam\left[a \rightarrow e\right]$	+	*thal* (x)
	-	*nem*	*nem+i+tha*	*nemitha*

Table 9: Verbal roots *nam*

Similarly, *thal* (*yam) = yayantha, yemitha; thal* (*tap) = tataptha, tepitha;*

thal (*śak) = śaśaktha, śekitha; thal* (*śap) = śaśaptha, śepitha;*

thal (*pac) = papactha, pecitha; thal* (*śad) = śaśattha, śeditha;*

thal (*sad) = sasattha, seditha; thal* (*yabh) = yayabdha, yebhitha;*

thal (*dah) = dadagdha, dehitha;thal* (*nah) = nanaddha, nehitha;*

(iii) Case III –

If x ∈ {*bhaj*}, then

$$thal\ (\mathrm{x}) = \begin{cases} bhaj\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[bh \rightarrow b\right] + bhaj + tha \\ bhaj\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[\mathrm{W} \rightarrow \emptyset\right] + bhaj\left[a \rightarrow e\right] + i + tha \end{cases}$$

bhaj	$bhaj\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[bh \rightarrow b\right]$	*bhaj*	+	*thal* (x)
	ba	*bhaj*	*ba+bhaj+tha*	*babhaktha*
	$bhaj\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[W \rightarrow \emptyset\right]$	$bhaj\left[a \rightarrow e\right]$		
	-	*bhej*	*bhej+i+tha*	*bhejitha*

Table 10: Verbal root *bhaj*

(iv) Case IV –

If x ∈ {*han*}, then

$$thal\ (\mathrm{x}) = \begin{cases} han\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[h \rightarrow jh\right]\left[jh \rightarrow j\right] + han\left[h \rightarrow gh\right] + tha \\ han\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[h \rightarrow jh\right]\left[jh \rightarrow j\right] + han\left[h \rightarrow gh\right] + i + tha \end{cases}$$

han	$han\left[\mathrm{C}\overset{\neq 1}{\rightarrow}\emptyset\right]\left[h\rightarrow jh\right]\left[jh\rightarrow j\right]$	$han\left[h\rightarrow gh\right]$	+	thal (x)
	Ja	*ghan*	*ja+ghan+tha*	*jaghantha*
	Ja	*ghan*	*ja+ghan+i+tha*	*jaghanitha*

Table 11: Verbal root *han*

(v) Case V –

If x ∈ {*bhañj*}, then –

$$thal\ (\mathrm{x}) = \begin{cases} bhañj\left[c'\overset{\neq 1}{\rightarrow}\emptyset\right]\left[bh\rightarrow b\right]+bhañj+tha \\ bhañj\left[c'\overset{\neq 1}{\rightarrow}\emptyset\right]\left[bh\rightarrow b\right]+bhañj+i+tha \end{cases}$$

bhañj	$bhañj\left[c'\overset{\neq 1}{\rightarrow}\emptyset\right]\left[bh\rightarrow b\right]$	*bhañj*	+	*thal* (x)
	ba	*bhañj*	*ba+bhañj+tha*	*babhaṅktha*
	ba	*bhañj*	*ba+bhañj+i+tha*	*babhañjitha*

Table 12: Verbal root *bhañj*

(vi) Case VI –

If x ∈ {*rañj*}, then –

$$thal\ (\mathrm{x}) = \begin{cases} rañj\left[c'\overset{\neq 1}{\rightarrow}\emptyset\right]+rañj+tha \\ rañj\left[c'\overset{\neq 1}{\rightarrow}\emptyset\right]+rañj+i+tha \end{cases}$$

rañj	$rañj\left[c'\overset{\neq 1}{\rightarrow}\emptyset\right]$	*rañj*	+	*thal* (x)
	ra	*rañj*	*ra+rañj+tha*	*raraṅktha*
	ra	*rañj*	*ra+rañj+i+tha*	*rarañjitha*

Table 13: Verbal roots *rañj*

Similarly, *thal* (*sañj*) = *sasaṅktha, sasañjitha*

(vii) Case VII –

If x ∈ {*yaj*}, then

$$thal\ (\mathrm{x}) = \begin{cases} yaj\left[c'\overset{\neq 1}{\rightarrow}\emptyset\right]\left[ya\rightarrow i\ a\rightarrow i\right]+yaj+tha \\ yaj\left[c'\overset{\neq 1}{\rightarrow}\emptyset\right]\left[ya\rightarrow i\ a\rightarrow i\right]+yaj+i+tha \end{cases}$$

yaj	$yaj\left[\mathrm{C}\overset{\neq 1}{\rightarrow}\emptyset\right]\left[ya\rightarrow i\ a\rightarrow i\right]$	*yaj*	+	*thal* (x)
	i	*yaj*	*i+yaj+tha*	*iyaṣṭha*
	i	*yaj*	*i+yaj+i+tha*	*iyajitha*

Table 14: Verbal root *yaj*

(viii) Case VIII –

If x ∈ {*vac*, *vap*, *vas*, *vah*}, then

$$thal\ (\mathrm{x}) = \begin{cases} vac\left[c'\overset{\neq 1}{\rightarrow}\emptyset\right]\left[va\rightarrow u\ a\rightarrow a\right]+vac+tha \\ vac\left[c'\overset{\neq 1}{\rightarrow}\emptyset\right]\left[va\rightarrow u\ a\rightarrow a\right]+vac+i+tha \end{cases}$$

vac	$vac\left[c'\overset{\neq 1}{\rightarrow}\emptyset\right]\left[va\rightarrow u\ a\rightarrow u\right]$	*vac*	+	*thal* (x)
	u	*vac*	*u+vac+tha*	*uvaktha*
	u	*vac*	*u+vac+i+tha*	*uvacitha*
vap	Same as above		*u+vap+tha*	*uvaptha*
			u+vap+i+tha	*uvapitha*
vas	Same as above		*u+vas+tha*	*uvastha*
			u+vas+i+tha	*uvasitha*
vah	Same as above		*u+vah+tha*	*uvoḍha*
			u+vah+i+tha	*uvahitha*

Table 15: Verbal roots *vac*, *vap*, *vas*, *vah*

(ix) Case – IX

If x ∈ {*tyaj*}, then

$$thal\ (\mathrm{x}) = \begin{cases} tyaj\left[c'\overset{\neq 1}{\rightarrow}\emptyset\right]+tyaj+tha \\ tyaj\left[c'\overset{\neq 1}{\rightarrow}\emptyset\right]+tyaj+i+tha \end{cases}$$

tyaj	$tyaj\left[c'\overset{\neq 1}{\rightarrow}\emptyset\right]$	*tyaj*	+	*thal (x)*

	ta	*tyaj*	*ta+tyaj+tha*	*tatyaktha*
	ta	*tyaj*	*ta+tyaj+i+tha*	*tatyajitha*

Table 16: Verbal root tyaj

(x) Case – X

If x ∈ {*skand*}, then

$$thal\ (\mathrm{x}) = \begin{cases} skand\left[c' \overset{\neq 2}{\rightarrow} \emptyset\right]\left[k \rightarrow c\right] + skand + tha \\ skand\left[c' \overset{\neq 2}{\rightarrow} \emptyset\right]\left[k \rightarrow c\right] + skand + i + tha \end{cases}$$

Skand	$skand\left[c' \overset{\neq 2}{\rightarrow} \emptyset\right]\left[k \rightarrow c\right]$	*skand*	+	*thal (x)*
	ca	*skand*	*ca+skand+tha*	*caskanttha*
	ca	*skand*	*ca+skand+i+tha*	*caskanditha*

Table 17: Verbal root *skand*

(xi) Case – XI

If x ∈ {*daṃś*}, then

$$thal\ (\mathrm{x}) = \begin{cases} daṃś\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right] + daṃś + tha \\ daṃś\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right] + daṃś + i + tha \end{cases}$$

daṃś	$daṃś\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]$	*daṃś*	+	*thal* (x)
	da	*daṃś*	*da+daṃś+tha*	*dadaṃṣṭha*
	da	*daṃś*	*da+daṃś+i+tha*	*dadaṃśitha*

Table 18: Verbal root *daṃś*

(xii) Case – XII

If x ∈ {*pracch*}, then

$$thal\ (\mathrm{x}) = \begin{cases} pracch\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right] + pracch + tha \\ pracch\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right] + pracch + i + tha \end{cases}$$

Pracch	$pracch\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]$	*pracch*	+	*thal* (x)
	pa	*pracch*	*pa+pracch+tha*	*paprașṭha*

	pa	*pracch*	*pa+pracch+i+tha*	*papracchitha*

Table 19: Verbal root *pracch*

(xiii) Case – XIII

If x ∈ {*bhrasj*}, then

$$thal\ (\mathrm{x}) = \begin{cases} bhrasj\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[bh \rightarrow b\right] + bhrasj + tha \\ bhrasj\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[bh \rightarrow b\right] + bhrasj + i + tha \\ bhrasj\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[bh \rightarrow b\right] + bhrasj\left[\mathrm{W} \rightarrow bharj\right] + tha \\ bhrasj\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[bh \rightarrow b\right] + bhrasj\left[\mathrm{W} \rightarrow bharj\right] + i + tha \end{cases}$$

bhrasj	$bhrasj\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[bh \rightarrow b\right]$	*bhrasj*	+	*thal* (x)
	Ba	*bhrasj*	*ba+bhrasj+tha*	*babhraṣṭha*
	ba	*bhrasj*	*ba+bhrasj+i+tha*	*babhrajjitha*
	$bhrasj\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[bh \rightarrow b\right]$	$bhrasj\left[W \rightarrow bharj\right]$	+	*thal (x)*
	Ba	*bharj*	*ba+bharj+tha*	*babharṣṭha*
	Ba	*bharj*	*ba+bharj+i+tha*	*babharjitha*

Table 20: Verbal root *bhrasj*

(xiv) Case – XIV

If x ∈ {*masj*}, then –

$$thal\ (\mathrm{x}) = \begin{cases} masj\left[\emptyset \overset{\bar{2}}{\rightarrow} n\right]\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right] + masj\left[\emptyset \overset{\bar{2}}{\rightarrow} n\right] + tha \\ masj\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right] + masj + i + tha \end{cases}$$

masj	$masj\left[\emptyset \overset{\bar{2}}{\rightarrow} n\right]\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]$	$masj\left[\emptyset \overset{\bar{2}}{\rightarrow} n\right]$	+	*thal* (x)
	Ma	*masnj*	*ma+masnj+tha*	*mamaṅktha*

	$masj\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]$	*masj*	+	*thal* (x)
	Ma	*masj*	*ma+masj+i+tha*	*mamajjitha*

Table 21: Verbal root *masj*

(xv) Case – XV

If x ∈ {*vyadh*}, then –

$$thal\ (\text{x}) = \begin{cases} vyadh\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[ya \rightarrow i\ a \rightarrow i\right] + vyadh + tha \\ vyadh\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[ya \rightarrow i\ a \rightarrow i\right] + vyadh + i + tha \end{cases}$$

vyadh	$vyadh\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[ya \rightarrow i\ a \rightarrow i\right]$	*vyadh*	+	*thal* (x)
	Vi	*vyadh*	*vi+vyadh+tha*	*vivyaddha*
	Vi	*vyadh*	*vi+vyadh+i+tha*	*vivyadhitha*

Table 22: Verbal root *vyadh*

(xvi) Case – XVI

If x ∈ {*svap*}, then –

$$thal\ (\text{x}) = \begin{cases} svap\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[va \rightarrow u\ a \rightarrow u\right] + svap + tha \\ svap\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[va \rightarrow u\ a \rightarrow u\right] + svap + i + tha \end{cases}$$

svap	$svap\left[c' \overset{\neq 1}{\rightarrow} \emptyset\right]\left[va \rightarrow u\ a \rightarrow u\right]$	*svap*	*'+' operator*	*thal* (x)
	Su	*svap*	*su+svap+tha*	*suṣvaptha*
	Su	*svap*	*su+svap+i+tha*	*suṣvapitha*

Table 23: Verbal root *svap*

Observations

From this, it is evident that –

(i) P's grammar has ingrained a concept called 'Mathematics of language'.

(ii) P attempted to model the Sanskrit language using the meta-language Sanskrit in the best possible way. Here, we attempted to remodel the grammatical data using the language of mathematics – mathematical symbols and equation method.

(iii) We treated optional forms using the functional approach, with the help of multi-valued functions. Doing so gave us new insights into the mathematical nature of the P's grammar.

(iv) This further brought into light the necessity of concepts such as *dvitva* (duplication), *abhyāsa* (the duplicated section), and notion of *aṅga* as well as *antya* (the ultimate syllable) being a by-default location of the conversion[18] denoted by the left-word arrow and number on top ($\overset{1}{\leftarrow}$).

(v) Understanding the rules and meta-rules (paribhāṣā) helps combine different cases and form a more general case. For example, Case II – {*nam, yam, tap, śak, śap, pac, śad, sad, nah, dah, yabh*}.

(vi) Sandhi plays a vital role. Modeling becomes a less tedious task if we consider sandhi-s as a separate function. This helps in combining the cases as well. For example, Case VII - {*vac, vap, vas, vah*}.

(vii) The mathematical modeling, in turn, re-emphasized the reason behind the employment of such techniques by P, i.e., to ensure brevity and form a more generalized system covering similar instances.

(viii) Mathematical modeling in this way helps identify some general patterns dependent upon the occurrence of specific syllables at certain places. The cases in the functions are grouped separately and defined as subsets, following the patterns noticed.

Concluding Remarks

We have noted that P's *sūtra*-s share similarity with the mathematical function, where there is - 1. Input in the form of a root word (e.g., *dhātu, prātipadika*), 2. Outputs (one or more than one) in the form of a *pada* or *vākya* , 3. The relationship in the form of the derivational process explained by the *sūtra* (e.g., substitution, *sandhi*, etc.) which generates the output, 4. The *sūtra* is triggered only when the conditions are fulfilled successfully, 5. The output thus produced

18 *alo'ntyasya* । - A 1.1.52

may become an input at next stage and trigger *sūtra*-s further and the process continues until there remains no rule which is fit to be operational.

Implications

This mathematical modeling positively impacts our understanding of the language and grammar. The advantage of mathematical models is that they can be analyzed precisely using mathematical theory and algorithms (Schichl, 2013). Mathematical modeling is a step towards achieving an acute understanding of the workings of P's grammar and preservation of the grammatical data in formats accessible to learners outside the field. The mathematical model can also form a base for further processing of the grammatical rules for natural language processing of the language with the help of well-defined input and output sets (Aggrawal & Kulkarni, 2018). Efforts can be made in this direction. There are 10 tenses in Sanskrit – *laṭ, liṭ, luṭ, lṛṭ, loṭ, laṅ, vidhiliṅ, āśīrliṅ, luṅ* and *lṛṅ*. This work attempted mathematical modeling of a small section, namely an exceptional case in *liṭ-lakāra*, i.e., *krādiniyama*. We look forward to studying and remodeling all the *lakāra* (tenses) in Sanskrit following the grammatical derivation dictated by P's rules.

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Appendix: Example of *thal* function by Panini's *sūtra*-s

As a part of our methodology, we prepared a list of aniṭ verbal roots based on their endings, noting the details of class (*gaṇa*) and *pada*. Following this, we wrote a detailed derivation of every verbal root and then the mathematical representation of it. The mathematical equation represents stages in the derivation starting from the augmentation or non-augmentation of *iṭ*. We note down the derivation process of three verbal roots viz. *ci* (ending in a vowel), *gam* (ending in a consonant), and *bhañj* (having consonant cluster) hereafter –

(a) *Aniṭ* verbal root ending in vowel *i* –

(i) *ci - ciñ cayane* । (*svādi* – 1251)

Steps	**Applicable rules**
ciñ	*ciñ cayane* । [19] – to collect
ci	*halantyam* । (1.3.3) In the initial enunciation, the final *hal* (consonant) is termed *it*. *tasya lopaḥ* । (1.3.9) The *it* marker is deleted.
ci + *liṭ*	*dhātoḥ* । (3.1.91) Suffixes enlisted onwards this rule, till the end of the third chapter, are added after a verbal root and have a *udātta* accent at the beginning. *parokṣe liṭ* । (3.2.115)

[19] This is not a rule but verbal root with its meaning as noted in the *dhātupātha*.

	The affix *liṭ* comes after the verbal root in the sense of the past, before the commencement of the current day and unperceived by the speaker. *laḥ karmaṇi ca bhāve cākarmakebhyaḥ* । (3.4.69) The tense affixes called *la* after *sakarmaka* (transitive) verbal roots are in the sense of *kartṛ* (agent) and *karman* (object); after *akarmaka* (intransitive) verbal roots are in the sense of *kartṛ* (agent) and *bhāva* (action).
ci + l	*upadeśe'janunāsika it* । (1.3.2) In the *upadeśa*, nasalized *ac* (vowel) is termed *it*. *halantyam* । (1.3.3), *tasya lopaḥ* । (1.3.9)
ci + sip	*lasya* । (3.4.77) The suffixes we shall announce hereafter are substituted in the place of *l*. *yuṣmadyupapade samānādhikaraṇe sthāninyapi madhyamaḥ* । (1.4.105) Verbal terminations called *madhyama* (2nd person) are used when *yuṣmad* (you) is understood, and the same is expressed by the verb; Word *yuṣmad* may be used or may not be used in the sentence. *dvyekayordvivacanaikavacane* । (1.4.22) The dual and singular case-suffixes are employed severally in the sense of *dvivacana* (duality) and *ekavacana* (unity).
ci + thal	*parasmaipadānāṃ ṇalatususthalathusaṇalvamāḥ* । (3.4.82) In *liṭlakāra*, *parasmaipada* suffixes are substituted by *ṇal, atus, us, thal, athus, a, ṇal, va* and *ma* respectively.

ci + tha	*halantyam* । (1.3.3), *tasya lopaḥ* । (1.3.9)
ci + tha *ci + iṭ tha*	*acastāsvatthalyaniṭo nityam* । (7.2.61) Suffix *thal* does not also get the augment *iṭ,* after a verbal root, which ends in a vowel and which is always devoid of the *iṭ* augment after the Periphrastic Future affix *tāsi.* *ṛto bhāradvājasya* । (7.2.63) In the opinion of *Bhāradvāja*, the suffix *thal* does not get the augment *iṭ* only after a root which ends in short *ṛ* and after which the Periphrastic Future *tās* is always devoid of the augment *iṭ*.

Without augment *iṭ*	
ci + tha	
ci ci + tha	*liṭi dhātoranabhyāsasya*। (6.1.8) When followed by a suffix of *liṭlakāra*, verbal root which is not already reduplicated, is reduplicated. *pūrvo'bhyāsaḥ*। (6.1.4) When reduplication is done, the first of the two is called *abhyāsa* (reduplicate).
ci ci + tha *ci ki + tha*	*vibhāṣā ceḥ*। (7.3.58) *c* of verbal root *ci* appearing after *abhyāsa* (reduplicate) is optionally substituted by *k*, when followed by *san* (Desiderative) and *liṭ* suffixes.
ci ce + tha *ci ke + tha*	*sārvadhātukārdhadhātukayoḥ*। (7.3.84) When followed by an *sārvadhātuka* or *ārdhadhātuka* suffix, the final *ik* (*i*, *u*, *ṛ*) vowel of a *aṅga* (stem) is substituted by a *guṇa* (*a, e, o*) vowel.
cicetha / ciketha	

With augment *iṭ*	
ci + iṭ tha	*halantyam* ।(1.3.3) *ādyantau ṭakitau* ।(1.1.46) Augment is added at the beginning if it has *ṭ* as *it* and at the end if it has *k* as *it*.
ci + i tha	*tasya lopaḥ*।(1.3.9)
ci ci + i tha	*liṭi dhātoranabhyāsasya* ।(6.1.8)
ci ci + tha *ci ki + tha*	*vibhāṣā ceḥ* ।(7.3.58)
ci ce + i tha *ci ke + i tha*	*sārvadhātukārdhadhātukayoḥ* ।(7.3.84)
ci cay + i tha *ci kay + i tha*	*eco'yavāyāvaḥ* ।(6.1.78) *e, ai, o,* and *au* are respectively substituted by *ay, āy, av* and *āv* when followed by a vowel.
cicayitha / cikayitha	

(b) Aniṭ verbal roots ending in a consonant

(i) *gam – gamlṛ gatau* ।(*bhvādi* – 982)

Steps	**Applicable rules**
gamlṛ	*gamlṛ gatau* ।– to go
gam	*upadeśe'janunāsika It* ।(1.3.2), *tasya lopaḥ* ।(1.3.9)
gam + liṭ	*dhātoḥ* ।(3.1.91), *parokṣe liṭ* ।(3.2.115), *laḥ karmaṇi ca bhāve cākarmakebhyaḥ* ।(3.4.69)
gam + l	*upadeśe'janunāsika it* ।(1.3.2), *halantyam* ।(1.3.3), *tasya lopaḥ* ।(1.3.9)
gam + sip	*lasya* ।(3.4.77), *yuṣmadyupapade samānādhikaraṇe sthāninyapi madhyamaḥ* ।(1.4.105), *dvyekayordvivacanaikavacane* ।(1.4.22)

gam + thal	*parasmaipadānāṃ ṇalatususthalathusaṇalvamāḥ* । (3.4.82)
gam + tha	*halantyam* । (1.3.3), *tasya lopaḥ* । (1.3.9)
gam + tha *gam + iṭ tha*	*upadeśe'tvataḥ* । (7.2.62) Suffix *thal* does not get the augment *iṭ,* after a verbal root which possesses a short *a* as its root-vowel in the *dhātupāṭha* and after which the Periphrastic Future *tās* is always devoid of the augment *iṭ.* *ṛto bhāradvājasya* । (7.2.63)

Without augment *iṭ*	
gam + tha	
gam gam + tha	*liṭi dhātoranabhyāsasya* । (6.1.8), *pūrvo'bhyāsaḥ* । (6.1.4)
ga gam + tha	*halādiḥ śeṣaḥ* । (7.4.60)
ja gam + tha	*kuhoścuḥ* । (7.4.62)
ja gaṃ + tha	*naścāpadāntasya jhali* । (8.3.24) *n* and *m* which do not occur at the end of a *pada* are substituted by *anusvāra* when followed by *jhal*. *jhal* = all consonants, except *h, y, v, r, l,* and nasals.
ja gan + tha	*anusvārasya yayi parasavarṇaḥ* । (8.4.58) *anusvārā* is substituted by a syllable homogenous with the latter one when followed by *yay*. *yay* = all consonants, except *ś, ṣ, s, h*
jagantha	

With augment *iṭ*	
gam + iṭ tha	*halantyam* । (1.3.3), *ādyantau ṭakitau* । (1.1.46)
gam + i tha	*tasya lopaḥ* । (1.3.9)
gam gam + i tha	*liṭi dhātoranabhyāsasya* । (6.1.8), *pūrvo'bhyāsaḥ* । (6.1.4)
ga gam + i tha	*halādiḥ śeṣaḥ* । (7.4.60)
ja gam + i tha	*kuhoścuḥ* । (7.4.62)
jagamitha	

(ii) *bhañj – bhañjo āmardane* । (*rudhādi* - 1453)

Steps	**Applicable rules**
bhañjo	*bhañjo āmardane* । – to reduce to ashes
bhañj	*upadeśe'janunāsika it* । (1.3.2), *tasya lopaḥ*। (1.3.9)
bhañj + liṭ	*dhātoḥ*। (3.1.91), *parokṣe liṭ*। (3.2.115), *laḥ karmaṇi ca bhāve cākarmakebhyaḥ*। (3.4.69)
bhañj + l	*upadeśe'janunāsika it*। (1.3.2), *halantyam*। (1.3.3), *tasya lopaḥ*। (1.3.9)
bhañj + sip	*lasya*। (3.4.77), *yuṣmadyupapade samānādhikaraṇe sthāninyapi madhyamaḥ*। (1.4.105), *dvyekayordvivacanaikavacane*। (1.4.22)
bhañj + thal	*parasmaipadānāṃ ṇalatususthalathusaṇalvamāḥ*। (3.4.82)
bhañj + tha	*Halantyam* । (1.3.3), *tasya lopaḥ* । (1.3.9)
bhañj + tha *bhañj + iṭ tha*	*upadeśe'tvataḥ* । (7.2.62) Suffix *thal* does not get the augment *iṭ,* after a verbal root which possesses a short *a* as its root-vowel in the *dhātupāṭha* and after which the Periphrastic Future *tās* is always devoid of the augment *iṭ.*

	ṛto bhāradvājasya । (7.2.63)

Without augment *iṭ*	
bhañj + tha	
bhañj bhañj + tha	*liṭi dhātoranabhyāsasya* । (6.1.8), *pūrvo'bhyāsaḥ* । (6.1.4)
bha bhañj + tha	*halādiḥ śeṣaḥ* । (7.4.60)
ba bhañj + tha	*abhyāse carca* । (8.4.54)
ba bhañg + tha	*coḥ kuḥ* । (8.2.30)
ba bhañk + tha	*khari ca* । (8.4.55)
ba bhaṃk + tha	*naścāpadāntasya jhali* । (8.3.24)[20]
ba bhaṅk + tha	*anusvārasya yayi parasavarṇaḥ* । (8.4.58)
babhaṅktha	

With augment *iṭ*	
bhañj + iṭ tha	*halantyam*। (1.3.3), *ādyantau ṭakitau* । (1.1.46)
bhañj + i tha	*tasya lopaḥ* । (1.3.9)
bhañj bhañj + i tha	*liṭi dhātoranabhyāsasya*। (6.1.8), *pūrvo'bhyāsaḥ* । (6.1.4)
bha bhañj + i tha	*halādiḥ śeṣaḥ* । (7.4.60)
ba bhañj + i tha	*abhyāse carca* । (8.4.54)
babhañjitha	

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[20] *nakārajāvanusvārapañcamau jhali dhātuṣu*। - *anusvāra* and *anunāsikas* are to be considered as modification of *nakāra*, when *jhal* follows.

HAND (ha:θ)
Embodiment and Metaphorical and Metonymic Expressions in Kashika: Bhojpuri Spoken in Varanasi

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Abstract: The present paper delineates a systematic analysis of metonymic and metaphoric expression of body part term *hand* in Bhojpuri in the light of relevant linguistics evidence in present day Bhojpuri in folk songs/ literature / movies or in colloquial language spoken by the Bhojpuri people that reveal the Bhojpuri conceptualization of hand as the faculty of cognition.
Key Words: Conceptualization, Hand, Cognitive, Bhojpuri, Metaphor, Metonymy

Introduction and Literature Review

It is rightly considered by the scholars from cognitive point of view that*: "our construal of reality is likely to be mediated in large measure by the nature of our bodies"* (Evans, Green 2006:45).

"The concepts we have access to and the nature of the 'reality' we think and talk about are a function of our embodiment: we can only talk about what we can perceive and conceive, and the things that we can perceive and conceive derive from embodied experience" (Evans, Green 2006:46).

The embodiment hypothesis is crucially associated with the Conceptual Metaphor Theory (CMT) introduced in Lakoff and Johnson (1980) and further elaborated in a rich bibliography

including most notably Johnson (1987), Lakoff and Johnson (1999). Within the theory of Conceptual Metaphor, the central idea is that metaphors, far from being purely linguistic devices, are conceptual in nature and grounded in bodily experience. Being conceptual in nature means that they are constitutive of cognition and being grounded in bodily experience implies that the body is a potentially universal source domain for structuring abstract concepts.

Similarly, metonymy is viewed in cognitive linguistics as one of the basic modalities of the working of cognition (Panther and Radden 1999): "Metonymy allows us to conceptualize one thing by means of its relation to something else; metonymic concepts structure not just our language but our thoughts, attitudes, and actions. Metonymic concepts are part of the ordinary, everyday way we think and act as well as talk" (Lakoff, Johnson 1980:37). The major difference with metaphor, it has been claimed by most cognitive linguists, is the fact that while metaphors involve mappings between two conceptual domains, metonymies operate within the same conceptual domain and are primarily characterized by a STAND FOR relation between a source and a target. The way they operate has been variously formulated: Langacker (1993) sees it as a process which consists in "mentally accessing one conceptual entity via another entity" (1993:30), Blank (1999) as "a linguistic device based on salient conceptual relations within a frame network" (Blank 1999:174), Radden and Kövecses (1999) as "a cognitive process in which one conceptual entity, the vehicle, provides access to another conceptual entity, the target, within the same Idealized Cognitive Model" (Radden, Kövecses 1999:21) so, for instance, English and Italian share the conventional metonymy EAR FOR ATTENTION: 'She has a fine ear for music' / *Ha un buon orecchio musical.*

It is now a widely shared view that it "plays a crucial part in the motivation of numerous conceptual metaphors, in protype categorization, in certain types of symbolism and iconicity, in certain types of pragmatic inferencing" (Benczes,

Barcelona, Ruiz de Mendoza 2011:2)

Idealized Cognitive Model" (Radden, Kövecses 1999:21). Barcelona (2000) stresses the fact that, like metaphors, metonymies are at one time a fundamental type of experientially motivated cognitive modeles, and subject to cultural variation ("Metaphors and metonymies are to a large extent culture-specific", 2000:6). While there is no denying that a great part of figurative meaning derives from our experiences with our own bodies, only a few extensive cognitive-

based linguistic studies exist comparing one specific body part in two or more languages, as Nissen (2006: 72) points out.

Objective and Methodology: The main objective of the paper is to highlight the metaphorical conceptualization of Hand in Bhojpuri and folk understanding of it from cognitive point of view. In Methodology, data cited from the general conversation with local people or heard in day to day conversation (specifically in Varanasi Region).

HAND (ha:θ)

Metaphoric or metonymic expressions of *hand* ,in Bhojpuri , point at culture-specificity as a necessary perspective from which analysis must proceed. If Bhojpuri *hand* raises for help, it may also raise to punish, pray, contribute, surrender, control or sometimes very skillful. Such related expressions of this body part are conceptualized to be wrapped with culture and experience.

Conceptual metonymies

HAND STANDS FOR SKILL

Many often heard proverbs, in Bhojpuri community, are related to *hand* in sense of skills. Here, we mean, *hand* stands for some skills. We can go through many such examples of *hand* metonymy which shows some skillful *hand in Bhojpuri.*

ha:θ kə səfa:i: (cleanliness of hand)
*etəna: ni:k ka:m tə ha:θ ke səfa:i: se hola: (*such good work is done with the cleanliness of hand/skillfulness hand.)
ha:θ əʤəma:wəl (to try hand)
*əb həməhũ ke ha:θ əʤəma:wə ke ba: (*even I have to try my hand)
təɪja:r *ha:θ* (ready or set hand)
təɪja:r *ha:θ se ka:m ələge ba:t hola:* (work with skilled hand is some thing different)

Here, the cognitive mechanism motivating the meaning of above example is *metonymy.* The conceptual metonymy ***HAND STANDS FOR SKILL*** liking its literal meaning to idiomatic meaning. In the above mentioned example ***ha:θ kə səfa:i:*** **(cleanliness of hand)** means

skillfulness or expertise of hand or the ability of a person to work **.** *Hand* is conceptualized in sense of to be skilled at its work, whether in example ***ha:θ əʤəma:wəl*** **(to try hand)** means to show one's skill in doing some work. In example **təɪja:r *ha:θ* (ready or set hand),** the idiom, expresses the meaning of skilled or expert hand or expert person at work. Thus, the conceptual metonymy **HAND STANDS FOR SKILL** also motivates the conceptual metonymy **HAND STANDS FOR PERSON.**

HAND STANDS FOR ASSISTANCE

Hand is very logically stands for assistance even in Bhojpuri like Hindi, English, Italian and many other languages too. Nature of work may be any but in assistance of the work *hand* always plays an important role that's why the conceptual metonymy HAND STANDS FOR ASSISTANCE seems to motivating the meaning of the following idioms.

ha:θ bãta:wə (to give somebody a helping hand)

ha:θ bãta:wə se ka:m tənı a:sa:n ho ʤa:ı (giving helping hand makes work little bit easy)

ha:θ ləga:wə (to touch or give hand for support)

tənı mədəd ke lıje ha:θ ləga: də (just give or touch with your hand for support)

Here, in above mentioned idioms *hand* is conceptualized as supporting hand or *hand* for assistance. Thus, the cognitive process or vehicle provides mental access to the target conceptualization of hand.

HAND STANDS FOR POSSESSION, POWER, AND CONTROL

The metonymic use of *hand* in Bhojpuri also shows HAND STANDS FOR POSSESSION, POWER, AND CONTROL. I find many *hand* metonyms where cognitive vehicle approaches to conceptualize Bhojpuri *hand* to possess, exert power, and to control somebody or something. For instance:

ha:θ ke ni:ʧe (to be under sb's hand)

səb həməre ha:θe ke ni:ʧe həʊ (everybody is under my hand)

In this Bhojpuri idiom, the *hand* is taken to mean to exert control over everybody. The concerned idiom expresses the meaning that how everybody is under control of somebody's hand. Thus, metonymically, *hand* can stand for a person too who controls everybody. This conceptual metonymy links the literal meaning to the idiomatic one on the basis of the actual use and experience of hand.

ha:θe me (to be in sb's hand)

səb kuʧʰ həmərе ha:θe me həʊ (everything is in my hand)

Similarly, idiom in example (2) also conveys the sense of hand 'under control'. The general conventional knowledge about the physiology of human being of having hands and the cognitive vehicle motivates to conceptualize the meaning of this idiom.

ha:θe se gəjəl/ bəhəre (get out of sb's hand)

ʊ hɑməre ha:θe se gəjəl/ bəhəre həʊ (he got out of my hand *or* he is out of my hand)

The conceptualization of this idiom also comes out of the literal meaning when something is lost or left from or hand. The idiom conveys the meaning of 'lost control' over somebody. The meaning of this idiom is also motivated by the conceptual metonymy of cognitive mechanism.

ha:θe biʧa:ɪl (to be sold off to sb's hand)

həm kehu ke ha:θe biʧa:ɪl na həɪ (I am not sold off to anybody's hand)

The idiom *ha:θe biʧa:ɪl* conveys the sense of to hand over the control of somebody to someone else, and thus the person who has purchased can do anything with the purchased one. The same happens in reality with the commodity or item when we purchase and possess in hand. The experience with this body part term motivates the mind to create such thoughts where one can idiomatically says *həm kehu ke ha:θe biʧa:ɪl na həɪ* (I am not sold off to anybody's hand)

ha:θe kə kʰɪləʊna: (to be the toy of sb's hand/ to play into sb's hands)

səb həmərе ha:θe kə kʰɪləʊna: həʊ (everybody is toy of my hand *or* everybody plays into my hand)

Similarly, example (6), we can play with a toy as we like since it is unresponsive, insensible, and inert and therefore it is completely under our control and power. Consequently, our cognition induces us to construct such idioms when we treat somebody the way we treat with a toy.

Since *hand* plays prominent role to control and giving direction, possess things and use willingly that's why such experiences with hand compel mind to route thoughts accordingly.

HAND STANDS FOR SPATIALITY

The hand stands for space metonymically. The knowledge regarding the function of the hand during any activity and the given conceptual metonymy plays the role in understanding the meaning of the idioms. We have many more examples of hand express the meaning of *space, proximity/availability***,** and *side* idiomatically.

ha:θe pər dʰərə (place on hand)

tʰoḍə tʰoḍ səbke ha:θe pər dʰərə (little bit place on every hand)

ha:θ pɑsɑ:rə (spread hand to have something on)

ha:θ pɑsɑ:rə ɑʊr lɑ: (spread hand and take it)

ha:θe pər ʊtʰɑ:wə (lift up on hand)

ha:θe pər rɑkʰə ke ʊtʰɑ:wə (lift up placing on hand)

Bhojpuri idioms related to *hand also* gives the sense of space . Metonymically *hand* plays the role of space where something can be put on. Example (1),(2) and (3) respectively communicating the same meaning.

e ha:θe (on this hand)

e ha:θe rɑkʰə (keep on this hand)

dusəre ha:θe (on other hand)

dusəre ha:θe rɑkʰə (keep on other hand)

The conceptual metonymy *hand* also expresses the meaning of *side* idiomatically.
e ha:θe rɑkʰə (keep on this hand) dusəre ha:θe rɑkʰə (keep on other hand) convey the sense of demonstrating *side to* keep the things there.

ha:θe pər (on hand)
i: səb tə ha:θe pər rɑhe lɑ: tʊ ʤəb ʧɑ:he təb le lɑ: (these are all on hand, you can take it whenever you wish)

Similarly, example (6), expresses the sense of *availability, ha:θe pər* (on hand) means things are available whenever wish to have.
Thus, the cognitive mechanisms of metonymy motivating the meaning of above idioms. In depth, of course, our experience pushes the cognition to consider this body part term into idioms accordingly and suitably.

Conceptual metaphors

Through tangible images, often metonymically rooted, metaphors with the words *hand* allow for expressions of abstract values, moods, attitudes of mind. Bhojpuri idioms, with *hand,* can also be understood with the help of one of the cognitive vehicles i.e. metaphors. Above mentioned idioms are explained by applying cognitive mechanism of metonymy.

HAND IS PRECIOUS METAL MEANS VERY SKILLFUL

sone kə hɑ:θ (hand of gold)
okər sone kə hɑ:θ bɑ: (he/she has golden hand)

The idiomatic meaning of the given construction *sone kə ha:θ (hand of gold)* is to be capable of doing things of very high quality. Since gold is very precious and valuable and this meaning is conferred upon hand due to cognitive approach. A *hand* becomes valuable when it creates valuable things or as it is very skillful.

TO HAVE DIRTY HAND IS TO BE DISHONEST

gəndɑ: hɑ:θ (dirty hand)

kehʊ kə deɪmɑ:ni: kɑr ke ɑ:pən hɑ:θ kɑhe gəndɑ: kɑre (why to make our hand dirty being dishonest for anybody)

Here, *hand* is conceptualized in sense of untruthfulness and treachery. This is our cognitive mechanism which makes the concept flow on differently in thoughts metaphorically. Thus, dishonesty and deception can be understood metaphorically by the concerned body part term *dirty hand.*

TO WASH HAND IS TO LOSE SOMETHING

hɑ:θ dʰo bəɪtʰɑnə (to sit washing hand)

əpne dʒɪd me hər ʧi:z se hɑ:θ dʰo bəɪtʰɑnə (in his insistence he washed hand from everything)

Here, washing hand from everything means to lose everything. Undoubtedly, metaphoric expression arise from people's normal and ordinary experiences of their bodies in action, and this serves as the source domain in conceptual metaphors .In Bhojpuri idiom *ha:θ dʰo bəɪtʰanə* (to sit washing hand), of course, has a cultural impact. When we wash hand nothing remains in hand, but, here it doesn't mean we have clean hand now. The idiomatic sense is quite different, it exerts a negative sense like *gənda: ha:θ* (dirty hand).

TO WEIGH HAND IS TO TEST THE SKILL

hɑ:θe ke təʊl (weigh the hand)

kɑ:m pɑr rəkʰe se pɑhɪle hɑ:θe ke təʊl lewe ke ʧɑ:hi: (one should weigh the hand before keeping on work/ giving job.)

Here, Bhojpuri cognition approaches towards correctness of weight; it indicates the experience of Bhojpuri people that how much they ensure themselves in correctness of weighing things. This experience inspires to cognize the *hand* idiomatically by the idiom *ha:θe ke təʊl* (weigh the hand) in the sense to test one's skill. As we check the weight properly before having any object so we do with the *hand.* The conceptual metonymy THE HAND STANDS FOR SKILL and the metaphor TO WEIGH HAND IS TO TEST THE SKILL seems to be motivating the meaning of the above idiom.

TO HOLD SOMEONE'S HAND IS TO MARRY OR TO SUPPORT

hɑ:θ tʰɑmhəl (to hold hand)

kehʊ gəri:b ke hɑ:θ tʰɑmʰ lɑ: (hold the hand of some poor one)

ʊ bɑʧəpəne me hɑmɑ:r tʰɑmʰ ke etənɑ: bɑɖʰ kəınə (he brought me up to this much holding my hand in childhood)

Holding hand of someone, in Bhojpuri, points out to marry or to support someone. Holding *hand* is conceptualized as to marry or to support someone. This is all on the basis of our experience with *hand* that how hand always comes first for support, it is with the *hand* only we help others, on the other hand there is a cultural aspect of *hand* in Bhojpuri as during marriage ceremony this is one of the practices to hand over the bride's hand into bridegroom's by the daughter's father, this shows that now the bride's whole sole responsibilities are all yours (bridegroom). Here, the cognitive vehicle moves on to create such metaphors in sense of support and marriage. Thus, *hand* is the source domain for 'to marry' or 'to support' as the target one.

HANDS ARE CONTAINER

This is another very general conceptual metaphor which motivates the idiomatic meaning of numerous idiomatic constructions in Bhojpuri too.

1) *ha:θe me* (in hand)

kʊʧʰo ʊnke ha:θe me rəkʰ da: (put something in his/her hand)

2) *kʰa:li: ha:θ* (empty hand)

a:ʤ ka:l həma:r ha:θ kʰa:li: həʊ (now-a-days my hand is vacant)

These idioms invoke an image of containing something in hand. The more specific conceptual metaphor THE HANDS ARE CONTAINERS TO PUT SOMETHING seems to be the motivating mechanism when speakers of Bhojpuri make sense of the idiomatic meaning of these idioms that is 'to be able to contain something'. Example (1) *kʰa:li: ha:θ* (empty hand) implies 'to be running out of money' means earlier it contained money and now it is empty which gives the sense of an empty container. Example (2) *kʊʧʰo ʊnke ha:θe me rəkʰ da*: (put something in his/her hand) means to give money as a token to a guest(in sense what Bhojpurian takes) , thus, these idiomatic constructions are also motivated with the conceptual metaphor THE HANDS ARE CONTAINERS

YELLOW HAND IS MARRIAGE

ha:θ pi:jar (yellow hand)

ləɪkɪ kə ha:θ ha:l pi:jar kər da: (get the girl's hand yellow soon)

Here, *yellow hand* is conceptualized as marriage. As usual, the meaning of the idiom is motivated by the cognitive mechanism. In Bhojpuri culture yellow (in marriage) stands for turmeric, it plays a very significant role in marriages as a ritual (both, bride and bridegroom have the massage of turmeric paste). Thus, our cognition motivates the mind to assume the yellow hand for marriage.

CONCLUSION

The functioning of our bodies is crucial for the structure of our conceptual system. In this chapter *hand* is the source domain to describe certain targeted senses through metaphors and metonymy, for language does not directly mirror personal experiences and beliefs of people's cultures and conventions. There are many more expressions in Bhojpuri *hand* but some of the linguistic expressions need native like control over the language to understand the inherent cultural meaning. For example:

bɪtɪja: kə ha:θ pi:jər kəj ke səmʤʰa: gəŋga: nəha: lehəlɪ

The meaning of the above expression is "married off a daughter means took a dip in holy Ganga river". In this example '*pi:jər ha:θ'* stands for the marriage because in Bhojpuri culture at the time of marriage it is mandatory to apply turmeric 'həldı' especially on the hand, leg and face of the bride and bridegroom too which makes it yellow, thus it is cultural specific to infer the meaning of the yellow hand.

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From Ancient Rome to Modern Europe: Tracing the Origins of CLIL Approach

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Abstract

An innovative approach that considerably contributed to the advancement of language teaching and learning is Content and Language Integrated Learning (CLIL). CLIL is defined as an approach to teaching and learning a subject and a language together. The focus in the CLIL approach is equally distributed between content (subject) and language. Though there have been studies on the effectiveness of CLIL in various contexts, research on the origins of CLIL is scarce. Moreover, studying the history of CLIL can help us better understand its current state. Therefore, the primary objective of this paper is to explore the origins of CLIL, from ancient Rome to modern Europe. In addition, the paper also discusses various definitions of CLIL. A systematic review method has been incorporated to carry out the study. The findings of the study could inform future research in language teaching and learning about the origins of CLIL.

Keywords: Origin of CLIL, Approaches and Methods, Language Teaching and Learning, Second Language Acquisition (SLA)

Introduction

There has been a quest to find the 'best' method which can yield optimal language learning outcomes. Since the dawn of the 'methods era', which started approximately in the late 19th century and continued till the end of the 20th Century, there have been multiple methods and approaches that came with the promise of transforming the field of language teaching and learning; from the grammar-translation method which started in the late 19th century to the recent Content and Language Integrated Learning (CLIL) (Richards & Rodgers, 2014). Though

no one method or approach has ever completely revolutionized language teaching and learning, they have significantly contributed to the advancement of the field, providing new insights into how language could be taught and learnt (Tickoo, 2004).

One such approach that considerably contributed to language teaching and learning is Content and Language Integrated Learning (CLIL) (Larsen-Freeman & Anderson, 2011). According to Richards and Rodgers (2014), the impact of CLIL on language teaching and learning has baffled even its earnest supporters. Though there have been studies on the effectiveness of CLIL in various contexts, research on the origins of CLIL is scarce (Hurajová, 2015; Muñoz Benito, 2020; Brunton, 2013). Moreover, studying the history of CLIL can help us better understand its current state (An, 2021). Therefore, the primary objective of this paper is to explore the origins of CLIL, from ancient Rome to modern Europe. In addition, the paper also discusses various definitions of CLIL. A systematic review method has been incorporated to carry out the study. The findings of the study could inform future research in language teaching and learning about the origins of CLIL.

Definitions of CLIL

The term **Content and Language Integrated Learning** (CLIL) was coined in 1994 (Coyle et al., 2010). David Marsh (2000), the pioneer of CLIL defines it as a dual-focused approach to "learning subjects or special modules through another language" (p. 6). In other words, CLIL is the integration of language learning with other subjects. A study conducted by the CLIL Compendium Research Team in 2001 identified CLIL as "the synergy resulting from communication orientation on the language, the content, and the interaction as it takes place within the classroom" (Marsh et al., 2001, p. 51). This definition depicts how CLIL encompasses both conversational language and academic language; combining both Basic Interpersonal Communicative Skills (BICS) and cognitive Academic Language Proficiency (CALP) (Cummins, 2001). Another study conducted by the Eurydice European Unit defines CLIL as the "teaching of a non-language subject through a foreign language," (Eurydice, 2006 p. 64). According to Do Coyle et al. (2010), CLIL can also be defined as "a dual-focused educational approach in which an additional language is used for the learning and teaching of both content and language," (p. 1). In layman's terms, CLIL is an approach to teaching and learning a subject and a language together. The focus in CLIL is equally distributed between content (subject) and language (Coyle et al., 2010).

In the area of language teaching and learning, CLIL is considered the offspring or the "ultimate dream" of the Communicative Language Teaching (CLT) approach (Bruton, 2013, p. 587). According to Diane Larsen-Freeman and Marti Anderson (2011), there are two versions of CLT: a 'weak' version and a 'strong' version. The weak version of CLT focuses on providing learners with opportunities to use the language, which Howatt (1997) describes as "learning to use English" (p.279). On the other hand, the strong version advocates the principle of "using English to learn" (Howatt, 1997, p.279). Larsen-Freeman and Marti Anderson (2011) state that CLIL belongs to the latter version of CLT and "is not exclusively a language program, but instead it integrates the learning of language with the learning of some other content" (Larsen-Freeman & Anderson, 2011, P.174). The content of CLIL can be any academic subject like mathematics, science, music, etc. CLIL is built on the core principle that the learning of a second/foreign language is optimal when learnt through subject-specific content (Richards and Rodgers, 2011).

Origin of CLIL

Learning a subject through a second/foreign language by itself is not a new concept. History has recorded many instances of education through a non-native language. Around 2000 years ago, after the invasion of the Greek Territory by the Roman Empire, education took place in an additional language. The Roman families who lived among the Greek-speaking communities had their children educated in Greek in order to increase their social, educational, and professional opportunities within the Greek territories. As a result of rapid globalization, a similar kind of situation emerged in Europe in the late 1980s and early 1900s (Coyle et al., 2010).

The convergence of economic and social forces along with prevailing globalization impacted the language choices of the people. Most of the regions in Europe became 'linguistically distinctive' which drove the European Union to learn from the success of the Canadian Immersion Programme in the 1970s and 1980s (Eurydice, 2006). After examining the exigency for a new educational approach, a resolution was approved by the Council of the European Communities and the Ministers Of Education, in a meeting held on 9th February 1976. The resolution proposed the implementation of research on "the need for the setting up of schools in which teaching would be in more than one language." (EC, 1976, p. No C 38/2). This resolution laid the foundation for an approach to teaching in an additional language, which

over a decade had gone through different transformations and emerged as CLIL (Eurydice, 2006).

In 1995, CLIL gained significant popularity with the European Commission's publication of the document titled "The White Paper. Teaching and learning. Towards the Learning society" (EC, 1995, as cited in Pavesi et al, 2001; Muñoz Benito et al., 2020). In 2005, the European Union Commission for Education solemnly declared CLIL as an approved methodology which in turn led to the formation of CLIL teachers and CLIL schools throughout Europe and in many countries in Asia including Malaysia, Thailand, China, etc. (Lal & Arun, 2017). In 2010, a concrete theory of CLIL methodology was published by Do Coyle, Philip Hood and David Marsh.

The Advent of CLIL in Language Teaching and Learning

Since CLIL amalgamates both content learning and language learning, theories pertaining to Second Language Acquisition (SLA) play as much role as general learning theories. The advent of CLIL, in the domain of language teaching and learning, is often associated with the epoch of the 'cognitive revolution'. The shift, from behaviourist ideologies to principles of cognition and communication was led by Jerome Bruner, Jean Piaget, and Lev Vygotsky. Their work immensely contributed to the advancement of constructivist perspectives on language teaching and learning. This was further perpetuated by other language teaching and learning theories like multiple intelligences, learner autonomy, learner awareness, language-learning strategies, etc. (Do Coyle, 2010). In addition, approaches like Communicative Language Teaching, English Medium Education (EME), English for Academic Purposes (EAP), English for Specific Purpose (ESP), the Canadian Immersion Programs and Content-Based Instruction (CBI) laid the foundation for the development of CLIL (Larsen-Freeman & Anderson, 2011; Richards and Rodgers, 2011).

Conclusion

This paper discussed various definitions of CLIL and explored the origins of CLIL starting from language learning in ancient Rome to contemporary Europe. After a systematic review of the available literature on CLIL, it has been observed that research on CLIL in the Indian context is scant. Though there has been substantial research on the effectiveness of CLIL in European and Southeast Asian contexts, the studies conducted in the Indian context are very

limited (Anuradha & Viswanathan, 2019; Luanganggoon, 2020; Hurajová, 2015; Lal & Arun, 2021). Therefore, the scope for research on CLIL in the Indian context is significantly high.

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Watching *Churuli* as a Tale of Hybrid and Liminal Spaces

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Abstract

This essay explores the relevance of spatiality in the Malayalam film "Churuli" directed by Lijo Jose Pellissery. The essay starts with an explanation of the spatial turn in film and literature, and how place affects the meaning of narrative. The author mentions James Joyce's attempts to contain Dublin in his writing as an example of the role of location in narrative. The study highlights how contemporary Malayalam movies move away from the conventional studio locations and bring in newer and more vibrant settings, which engage the audience more.

"Kumbalangi Nights" and "Angamali Diaries" are given as examples of how certain locations enhance stories.

In "Churuli," the dreamlike storyline traces the adventures of two undercover policemen, Shajeevan and Anthony, who are chasing a criminal. The location of Churuli itself becomes a character, taking an active role in shaping the unfolding of the plot. The author contends that the location gains meaning, turning it from a backdrop into an essential element of the film experience. Finally, the research assumes that investigating hybrid and liminal spaces in "Churuli" not only improves the viewing experience but also acts as a broader reflection of themes of identity and belonging across contemporary art.

Keywords: *Churuli*, Malayalam movie, Spatiality, Liminal spaces, Hybrid spaces

The question of where, now, more than ever, precedes the when and how in literature and films after the spatial turn that happened gradually. Where we live and when we live can be, at times, two of the most important factors when it comes to art. Take for example, James Joyce's works. In his words, "I want to give a picture of Dublin so complete that if the city suddenly disappeared from the earth, it could be reconstructed out of my book." Thus, when artists become conscious of a sense of the place they are attached to or are interested, a geography, real or imagined, it gets reflected in their works significantly.

It is only in the recent times that movies started moving out of the premeditated and closed spaces of studios. Places like Hollywood or Ramoji Film City in Hyderabad or Merryland studios in Thiruvananthapuram is still used, beyond a doubt. However more effort in terms of concepts as well as visuals has been undertaken to make the film experience deeper. This is true in the case of Malayalam movies as well. See for example some of the popular movies like Kumbalangi Nights or Angamali Diaries which have two places in its title itself which are Kumbalangi (a village in Ernakulam district of Kerala) and Angamali (a town in Thrissur district of Kerala) respectively. It is a matter worth noting and discussing that, movies are slowing shifting their gaze towards non-city areas.

Movies set in familiar cities have invaded our film viewing culture so much that every time a new movie that does not use erstwhile Victoria Terminus to represent Bombay or Chennai Central Railway station's heritage building to show Tamil Nadu gives a fresh relief. Not just as a mere setting, a place acquires layers of meaning when it becomes an integral part of a

movie. In this paper, the setting of *Churuli*, a 2021 movie directed by Lijo Jose Pellissery, is being analysed.

Centred in a place called "Churuli" this Lijo Jose Pellissery movie is a surreal tale of an absconding criminal followed by two policemen. Once they reach the place called Churuli things take a mysterious turn. It is this place that determines the narrative turns in the movie.

Set in the wild backdrop of Churuli, a remote village in north Kerala, the film begins with a woman (Geethi Sangeetha) narrating an ancient myth to Shajeevan (Vinay Forrt), one of the central characters. Shajeevan and Anthony (Chemban Vinod Jose) are two undercover police officers in search of an infamous criminal who is suspected to be in Churuli. The mystery deepens as both are clueless about his appearance. *Churuli* is all about the two police officers' startling experience in the uncanny land and, magnificently enough, each viewer might have a different idea about what makes *Churuli* uncanny. (Bindu, 2021)

According to Mikhael Bakhtin's carnivalesque theory, the dominant and authoritarian is subverted through art, especially rooted in folk culture, which uses laughter as the main tool. In Lijo Jose Pellissery's *Churuli* too, such a carnival space is created. It is clearly demarcated by certain geographical boundaries, too. Once the bridge portrayed in the movie is crossed, one reaches a realm that is totally free of the laws of the land. What is profane and sacrilegious becomes normal there. Instance of people using profanities casually is portrayed in the movie which also stirred controversies. So is the case with the subtle indications of deviant sexual behaviours shown in the movie, which would have been a crime otherwise. Though Bakhtin's carnival theory is related to the folk, here *Churuli* pertains to a forest's raw and untamed instincts. Still, the carnivalesque nature has deep similarities as observed in the following excerpt:

> Folk culture appears periodically as a culture of laughter by means of an ensemble of rites and symbols, a temporarily existing life-form that enables the carnival to take place. By contrast, the principle of law that organizes the carnival is transtemporal and universal. Laughter rises above and transcends the objects at which it is temporarily aimed: official institutions and the sacral. It is a laughter that shakes the specie-body of humanity, it is collective and directed at the "world whole" (Lachmann, 1988).

Similarly, the carnivalesque laughter is aimed at something higher which happens in the movie as well. The toddy shop, which is considered as a cult popular place in Malayalam

culture, becomes the focal point for all the people in the place called Churuli. This same toddy shop becomes a church kind of space when there is a function in the shop owner's family. That the two policemen in mufti, who would have yielded the most power among others in a normal place outside Churuli becoming a target of jokes and bully is another indication that the space called *Churuli* is carnivalesque.

In *Churuli* space gets dynamized and time gets spatialised. The time and space dichotomy becomes a blurred amalgamation as one progresses in the narrative as well. This aspect of the space called Churuli lends it a surreal, mysterious, and sci-fi approach. To elucidate more on the landscape dimension of the movie Kenneth Helphand's four tier approach can be used which is mainly Landscape as setting, Landscape as character, Landscape as symbol and landscape as subject. All these four treatments of landscape is effectively implemented in the movie as well.

When it comes to Landscape as a setting *Churuli* lends a credible geographical point in Kerala which is quite far literally and metaphorically from the usual Malayalee social discourse. However, the people of the village *Churuli* were not at all happy with the portrayal of the place as a hub of criminals who abscond and live a lawless life. When the second aspect of Landscape as a character is considered, the place is very well characterised and established right from the beginning through sounds and visuals. Especially the folk tale narrated by actress Geethika and the spiral hairpins leading to the place.

Landscape as a symbol can be interpreted in many ways. *Churuli* can be identified with our own minds which has many layers. The journey that the policemen undertake can be considered as the journey towards dense forest like subconscious and unconscious within ourselves. The sexual encounters they face in the place can be read as discovery of their inner self, which makes *Churuli* a symbol for the unexplored libido in humans. If *Churuli* can be considered as a maze, it can be considered as a symbol of society, culture or even language. Landscape as a subject is beautifully conveyed through the surreal visuals as well as sounds that puzzles the two newcomers. The wide expanse that defines *Churuli* is beautifully incorporated into the narrative by having points of action dispersed throughout the place.

In Michel Foucault's heterotopias theory, an imaginary space reverses or problematizes the reality of the external world. In Churuli, the village is an uncanny, supernatural place that subverts everyday understanding of time, morality, and conduct. It dislocates the protagonists

(the two policemen), who get drawn into the village's disordered and primal existence, demonstrating a reversal of their civic roles as agents of law enforcement. The illusions of control and authority unravel as they immerse deeper into the environment, and the boundaries between the real and surreal blur.

A compensatory space, within Foucault's theory, generates an idealized or ideal reality. Churuli is a compensation for the absence of free expression in the external world in the form of a lawless, nearly mythic setting where the norms of society are suspended. The inhabitants move freely without fear of reprisal, engaging in violence, dishonesty, and basic instincts.

Anthropologist Victor Turner has described liminality as a period during a ritual when participants are "betwixt and between" states of the established norms. Churuli is an example of such as a place suspended between the mundane and an unpredictable, transformative experience. The village and forest also serve as a threshold space, in which the two policemen lose their selves and slowly let go of their hold on reason and logic. They are not quite in the "real" world and not clearly in an alternate one.

The hybrid status of Churuli comes from how it is the merging of mythical and real elements. It adopts folklore (legend of mischievous spirit Perumadan) while being an actual physical site. Its merging of concrete and abstract nature further reinforces its state as a space that lies across reality and fantasy. The corporeal journey into the jungle parallels the psychological fall into disorder. The maze-like roads and eerie atmosphere of the village represent a literal and symbolic maze, corresponding to Foucault's idea of the heterotopia as a "space of crisis" or deviation. Churuli is an expression of society's repressed desires and operates as a mirror reflecting the policemen's underlying inclinations, heightening the illusion of order within society and offsetting its rigidity.

Thus, the particular use of a landscape to explore the narrative capabilities or to establish a comfortable pad to pitch in the concept or to use it as a subtext to validate an idea that vaults into the infinity of fantasy, place becomes more than just a place. For a spectacle that film is, this becomes more emphatic and evident. Churuli, as a liminal hybrid space captures the dynamics of illusion, compensation, and transformation. The movie provides an opportunity for the viewer to interrogate the margins between civilization and primitive desire,

reality and myth, and order and randomness. In so doing, it captures the heterotopic and liminal qualities, thus becoming a fruitful site of interpretation

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Negation Marking in Khelma

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Abstract

The present paper "Negation marking in Khelma" discusses about the language spoken by Khelma people mainly settled in South Assam, particularly Hailakandi and Karimganj ditricts of Assam. Khelma also known as Sakachep is one of the old Kuki tribes of Northeastern India. According to native speakers, there are approx. 8000 Khelma speakers. There is no authentic report about the population of Khelma as the cencus report shows no data regarding the total population of the community. According to the policy of government of India, the number of speakers for those whose mother tongues are spoken by lesser than 10,000 persons is not published.

The present paper attempts to describe the various negation marking system in Khelma such as declarative, existential, possessive, locative, negative indefinite, negative strengthening, negative future tense, imperative negation, hortative negation, negation in interrogative clause, negative conditional and negative probability. The negative construction mentioned above will be further discussed in detailed in this paper.

Keywords: Khelma, Kuki-Chin, Tibeto-Burman, Negation.

1.0 Introduction

Khelma or Sakachep is among one of the old tribes of Kuki in Northeast India. They are originally known as Sakachep in other parts of Northeast India i.e., Barak Valley, Karbi Anglong of Assam, also in the neighbouring states like Nagaland, Tripura, Mizoram, etc. The language is popularly known as *'Khelma'* only in Dima-Hasao district of Assam, as it is to be believed that they were named by a Dimasa king. *Khelma/Sakachep* is the name of the language and the people. The current paper is mainly based on the Khelma speaking people residing in Barak Valley, particularly

Hailakandi and Karimganj districts of Assam. It is also one of the unexplored and under documented language like many other tribal languages of Northeast India.

The reason why Khelma or other Kuki-Chin languages is not included in UNESCO's list of endangered languages is that, these languages are hardly known to the outside world. Khelma people lack their own written literature and script, and are yet to be presented for academic exploration in the codified form. They use Roman script to write their language with notable changes.

Phonologically, one of the typical features of Kuki-Chin languages i.e., the presence of initial velar nasal *ŋ* is present in the language. It has strong agreement system. Gender distinction is not grammatically marked in the language. Khelma has decimal type numeral system and it has dominant SOV word order. In Khelma, an inclusive-exclusive distinction is found in the preverbal system. The present paper attempts to explore the linguistic structure showing the negation marking system of Khelma of Barak Valley.

2.0 Negation in Khelma

In most of the Tibeto-Burman languages negation is expressed by means of affixation. Therefore, negation in Khelma is expressed by means of suffixation. The negative markers present in the language are ***/mu/*** or /***mək***/, /***no***/, ***/nok/*** and ***/loi/***. All the negators are used in different construction in the language. Negative agreement particles can be seen in the language. For instance, the agreement particle ***ŋ*** occurs with the 1st person along with the post-verbal particle ***u*** and ***me*** is attached post-verbally with the 1st person plural; ***če*** is attached with both the 2nd person singular and plural whereas ***u*** is prefixed with ***če*** for 2nd person negative construction. No such particle can be seen in 3rd person negative construction. The plural marker ***ui*** can be seen attached post-verbally along with the negative marker in the 3rd person negative plural. Since, vowel harmony is very common in the language, in every 1st person singular negative construction the negator /***mək***/ is seen as ***/mu/*** because of the postverbal particle ***u***. Therefore, it is to be believed that the reduced version of /***mək***/ i.e., *ma?* has been harmonized in the construction. The post-verbal negative construction which we will consider is post-verbal *mak* (or a reduced version such as *ma?*). This appears to be restricted to the Northwestern languages in Kuki-Chin,

although it is also present in some of the Naga languages. It is found in a variety of groups up and down throughout the Patkai Range. (Delancey, 2014).

2.1. Negator */-mək/*

The negator ***-mək*** in Khelma is used to negate both the verbal and non-verbal predicates which include declarative, existential, possessive, locative, negative indefinite, negative strengthening and negation in interrogative clause.

2.1.1. Negation in declarative clause

The declarative clause is unmarked morphologically in Khelma. The negator ***-mək*** is used to negate both verbal and non-verbal types of declarative clause in all the three persons, whereas in the 1st person constructions it is reduced as ***ma?***, and then ***mu*** due to vowel harmony occurrence present in the language as given in example 2. In some languages the absence of final consonant can be seen, i.e., it is reported as having post-verbal *-ma*; in some instances this might just be a case of a final glottal stop not being able to transcribed, or it might indicate further phonological erosion *-mak> .ma?> -ma* (Delancey, 2015)

(1)	*keima*	*bu*	*ke-nek*	
	1SG	rice	1SG-eat	
	‘I eat rice.’			
(2)	*keima*	*bu*	*nek-mu-u-ŋ*	(verbal)
	1SG	rice	eat-NEG-PV-1SG	
	‘I don’t eat rice.’			
(3)	*əma*	*sakačep*	*ə-ni*	
	3SG	sakachep	3SG-COP	
	‘S/he is Sakachep.’			
(4)	*əma*	*sakačep*	*ni-mək*	(non-verbal)
	3SG	sakachep	COP-NEG	
	‘S/he is not Sakachep.’			

2.1.2. Existential

In Khelma, the common negator ***-mək*** is used to negate the existential/ possessive/ locative construction. The negator ***-mək*** follows the existence morpheme ***-om*** for the existential construction clause as given in the below examples.

(5) *gilas-a* *tui* *om-mək*
glass-LOC water EXIST-NEG
'There is no water in the glass.'

(6) *ziri-a* *ŋa* *om-mək*
pond-LOC fish EXIST-NEG
'There is no fish in the pond.'

2.1.3. Possessive

In Khelma, the possessive morpheme ***-don*** followed by the common negator ***-mək*** is used to negate possessive construction as in examples 7-9.

(7) *keima* *sum* *don-mu-u-ŋ*
1SG money have-NEG-PV-1SG
'I don't have money.'

(8) *nəŋma* *sum* *don-mək-če*
2SG money have-NEG-2SG
'You don't have money.'

(9) *əma* *sum* *don-mək*
3SG money have-NEG
'S/he doesn't have money.'

From, the above examples, it can be seen that the negator ***-mək*** in example 7 (ma?/mu) is attached with the post verbal particle ***u*** followed by the particle ***ŋ*** (1SG) in the 1st person singular negative construction; ***me*** is attached for the 1st person plural; ***če*** for both 2nd person singular and plural and for the 3rd person

singular and plural only the negator ***-mək*** can be seen without any person particle attached.

2.1.4. Locative

Similarly, the common negator ***-mək*** is used to negate the locative construction for all the three persons as given in the following examples 10 and 11.

(10)	*nəŋma*	*ronpur-a*	*om-mək-če*
	1PL	ronpur-LOC	EXIST-NEG-2

'You are not in Ronpur.'

(11)	*əma*	*tlaŋpui-a*	*om-mək*
	3SG	tlangpui-LOC	EXIST-NEG

'S/he is not in Tlangpui.'

2.1.5. Negative Infinitive Pronoun

Iwasaki and Ingkaphirom (2005) stated that most of the languages of East and Southeast Asia typically lack indefinite pronouns. As Khelma lacks negative indefinite pronouns, it demonstrates the same grammatical traits as East and South Asian languages. The negative indefinite pronouns in Khelma are formed by negating the verb rather than pronominal forms. To negate such type of construction the general negator ***-mək*** is used in the language as shown below.

(12)	*tu-te*	*mi*	*midit-mək-ŋei*
	who-even	1SG	like-NEG-PL

'Nobody likes me.'

(13)	*ki-in-a*	*tu-te*	*hoŋ-mək-ŋei*
	1SG-home-LOC	who-even	come-NEG-PL

'Nobody came to my home.'

2.1.6. Negative strengthening

In Khelma, the negative strengthening is formed by intensifier ***-ŋai*** post-verbally followed by the negator ***-mək***, followed by the particles as in examples 14 and 15.

(14) *keima* *t^hei* *sək-ŋai-mu-u-ŋ*

1SG fruit eat-INTS-NEG-PV-1SG

'I never eat fruit.'

(15) *əma* *sək-ŋai-mək*

3SG eat-INTS-NEG

'S/he doesn't eat at all.'

2.1.7. Negation in Interrogative clause

The general negator ***-mək*** is used to negate the interrogative clause in Khelma. The negator ***-mək*** **is** attached post-verbally along with the agreement particle followed by the question particle ***-mo*** as shown in the followings examples 16-18.

(16) *nəŋma* *k^helma* *ni-mək-če-mo*

2SG Khelma COP-NEG-2SG-Q

'Aren't you Khelma?'

(17) *əma* *mu-mək-če-mo*

2SG see-NEG-2SG-Q

'Don't you see him/her?'

(18) *əma* *ralte* *ni-mək-mo*

3SG ralte COP-NEG-Q

'Isn't he Ralte?'

2.2. The negator */-no/*

The negative marker ***-no*** can be seen in future, imperative and hortative constructions in Khelma.

2.2.1. Negative Future tense

In negative future construction, the negator ***-no*** is attached post-verbally, followed by the future ***-ni*** and the agreement particle. The particle ***ŋ*** occurs with the 1st person singular, ***me*** with the 1st person plural, ***ti*** occurs with the 2nd person singular and plural, no such particle are seen attached with the negator ***-no*** and future ***-ni*** for 3rd person constructions as shown in examples 19-23.

(19) *keima* *sək-no-ni-ŋ*

1SG eat-NEG-FUT-1SG

'I will not eat.'

(20) *keini* *se-no-ti-ni-me*

1PL go-NEG-1SG-FUT-1PL

'We (EXCL) will not go.'

(21) *nəŋma* *nek-no-ti-ni*

2SG nek-NEG-2SG-FUT

'You will not drink.'

(22) *nəŋni* *nek-no-ti-ni-ui*

2SG drink-NEG-2SG-FUT-2PL

'You (PL) will not drink.

(23) *əma* *hoŋ-no-ni*

3SG come-NEG-FUT

'S/he will not come.'

2.2.2. Imperative Negation

In imperative construction the negative marker ***-no*** is attached post-verbally followed by the imperative marker ***-ro*** as shown in examples 24 and 25.

(24) *innui-no-ro*

laugh-NEG-IMP

'Don't laugh'

(25) *ŋa sək-no-ro*

fish eat-NEG-IMP

'Don't eat fish.'

2.2.3. Hortative Negation

A negative hortative construction in Khelma is expressed by suffixing the negator ***no*** to the root verb along with the hortative marker ***-rase*** as shown in examples 26 and 27.

(26) *əma se-no-rase*

3SG se-NEG-HORT

'Let him/her not go.'

(27) *əma* t^h*i-no-rase*

3SG die-NEG-HORT

'Let him/her not die.'

2.3. Negative Conditional */-nok/*

In the negative conditional construction, the negator ***-nok*** is used to negate the sentence as given in examples 28 and 29. The negator ***-nok*** is seen attached with the conditional ***-ten,*** followed by the focus marker ***-ču.***

(28) *kei ke-nek nok-ten-ču nəŋ lei-nek-ro*

1SG 1SG-eat NEG-COND-FOC 2SG PERM-eat-IMP

'If I don't drink than you drink.'

(29)	*no-hoŋ*	*nok-ten-ču*	*kei*	*se-ki-ti*
	2SG-go	NEG-COND-FOC	1SG	go-1SG-FUT

'If you don't come than I will go.'

2.4. Negative marker */-loi/*

2.4.1. Negative probability

The negative probability is expressed by the negative marker ***-loi*** in Khelma which is attached to the verb root, followed by the probability ***-hom,*** followed by the capabibilty ***-t^{h}ei*** as given in the following examples 30 and 31.

(30)	*keima*	*ke-se-loi-hom-t^{h}ei*
	1SG	1SG-eat-NEG-PROB-CAP

'I may not go.'

(31)	*ənni-ŋei*	*ən-hoŋ-loi-hom-t^{h}ei*
	3PL-PL	3PL-come-NEG-PROB-CAP

'They may not come.'

The negative marker ***-loi*** is also used to negate some of the adjective words as shown in the following examples.

Khelma	**Gloss**	**Khelma**	**Gloss**
var	'wise'	*var-loi*	'unwise'
int^{h}ik	'certain'	*int^{h}ik-loi*	'uncertain'
mut^{h}ei	'visible'	*mut^{h}ei-loi*	'invisible'
nit^{h}ei	'possible'	*nit^{h}ei-loi*	'impossible'

3.0 Conclusion

From the above analysis the following conclusions can be drawn. Negation in Khelma is expressed by means of suffixation. The negative markers present in the language are ***/mu/*** or /***mək***/, /***no***/, ***/nok/*** and ***/loi/.*** The common negative marker is ***/mək/*** or ***/mu/*** which is used to negate the declarative (verbal and non-verbal), existential, possessive, locative, negative strengthening and negative interrogative constructions. The negative agreement particles which are attached along with the negative marker ***-mək*** are: ***ŋ*** for 1st person singular, ***me*** for 1st person plural; ***če*** for 2nd person singular and plural whereas no such particle is seen attached in the case of 3rd person singular or plural. The second negative marker ***-no*** occurs in future, imperative and hortative constructions. In the future negative construction, the negative agreement particles are seen such as: : ***ŋ*** for 1st person singular, ***me*** for 1st person plural; ***ti*** for 2nd person singular and plural whereas no such particle is seen attached in the case of 3rd person singular or plural. The third negator ***-nok*** is only used to negate the conditional construction. The fourth negative marker ***-loi*** is used to negate the probability construction and also to negate some of the adjective words as mentioned above. All the negative markers occur post-verbally in the language.

Furthermore, more thorough investigation is needed in terms of nominalised clause, relative clause, double negation construction etc, in negation marking system of Khelma.

Abbreviations

1	first person
2	second person
3	third person

CAP	capability
COND	conditional
COP	copula
EXCL	exclusive
EXIST	existential
FOC	focus
FUT	future
HORT	hortative
IMP	imperative
INCL	inclusive
INTS	intensifier
NEG	negative
PROB	probability
PL	plural
PV	post-verbal
SG	singular
QP	question particle

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Language Education in India-2025
(A Call for 'Mother Tongues First' in Education)

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'We have impoverished our mother tongue because of our love for English. We demean ourselves by insulting our language' --
Mahatma Gandhi

Mother Tongues in India Today

Latest-2011(since 2021 census is not held) count of Indian mother tongues/languages informs that Census had a raw return of 19,569 mother tongues. After due processing of this data, it has arrived at a list of 121 languages. Among them, 22 are part of the Eighth Schedule of the Constitution and the rest of the 99 are non-scheduled languages. These 22 Scheduled languages embed 122+ mother tongues, the 99 Non-scheduled languages embed 149+ mother tongues. Thus, India is an abode of more than 271+ countable and nameable mother tongues and more than a thousand un-named mother tongues. Provincial Education Ministers in 1949 had said that 'The mother-tongue will be the language declared by the parent or guardian to be the mother-tongue.' The Census- 2011 recognizes mother tongue as 'The language spoken in childhood by the person's mother to the person. If the mother died in infancy, the language mainly spoken in the person's home in childhood will be the mother tongue. In case of infants and deaf mutes the language usually spoken by the mother…in case of doubt, the language mainly spoken in the household…' In the context of the linguistic minorities the Constitution Bench of the Supreme Court of India on May 6, 2014 said that 'Mother tongue…means the language of the linguistic minority in a State and it is the parent or the guardian of the child who will decide what the mother tongue of child is.'

Introduction: Again in 2025, the question of language education has come to the forefront

in India. Blistering debate is going on in the Parliament, state legislatures, active mass media and among the public at large. The danger of another language replacing the mother tongue of the student in education looms large-first as a school language and next as the medium of instruction. The present debate is one sided-Hindi vs some official languages of the states. Discussants have ignored the role of hundreds of mother tongues in education. In India, the status as recognized by the Census-all languages are mother tongues, but all mother tongues are not languages. The issue needs an un biased academic analysis away from the political band wagon. In this context, first it is necessary to briefly look into the roles that makers of the Constitution assigned for different languages, mother tongues in post-independence India.

Administration: The Constitution of India provides for the use of one or two or more languages in the administration of the Union and States. Article 343 states that (1) the official language of the Union shall be Hindi in Devanagari script. For official purposes of the Union the international form of Indian numerals shall be used. (2) Notwithstanding anything in clause (i), for a period of fifteen years from the commencement of this Constitution, the English language shall continue to be used for all the official purposes of the Union for which it was being used immediately before such commencement. At the level of the Union, English is serving as a neutral language for multiple language speakers of the country since her independence and may do so for many decades or centuries to come. The state legislatures were constitutionally empowered to adopt any one or more language/s used in the state or Hindi as the language/s used for official and other purposes in the states. Hence, most of the states have provisions for use of multiple languages in administration though they declare one language which is normally a language of majority of people as the official language in their Official Language Act. Correspondence between the union and the states and vice versa and also between the states is an important factor. The Article 346 makes provision for use of the official language of the union for communication between the union and states and also between two states. At the same time, if there is an agreement between two states, they can use Hindi for inter-state communication

Parliament/Legislature: Representatives of the people in the parliament and the legislature have different mother tongues and they need not necessarily know or be conversant

with the official language of the union or languages of administration. Hence, in parliament though the official business is transacted in Hindi and English, there is a provision under Article 120 that the parliament member shall be permitted by the Chairman / Speaker to address the house in his/her mother tongue. In the similar manner in the state legislature too if a member is unable to express in the official language of the state or Hindi or English, the Speaker will permit him/her to address the house in his or her mother tongue under Article 210.

Grievances Redressal: There is an inbuilt mechanism for redressing grievances of the citizens. For this purpose, under Article 350 the citizens of India have a provision to submit their representation to the union or the state in any language used in the state or the union. This clearly indicates that declaration of one or more languages as official languages and making provision for use of other languages and mother tongues in administration, parliament, legislatures, grievances' redressal are attempts to keep harmony among the population. *It has to be celebrated that the mother tongues have a respectable role in these domains of language use.*

Judiciary: The judiciary has three important levels of structure: The lowest at the sub-divisional and/or at district level, the High Court at state level and the Supreme Court at the highest level. English is the language to be used for 'all proceedings in the Supreme Court, High Court, authoritative texts of all Bills to be introduced or amendments moved in either House of Parliament or in either House of the Legislature of a State Article 348(1) (i); all Acts passed by Parliament or the Legislature of a State Article 348(1) (ii); and all Ordinances promulgated by the President or the Governor of a State, and all orders, rules, regulations and bye-laws issued under the Constitution or under any law made by Parliament or the Legislature of a State' Article 348(1) (iii); In the instances where the 'State has prescribed any language other than the English language for use in Bills, Acts, Ordinances a translation of the same in the English language be published under the authority shall be deemed to be the authoritative text in English language. ' Article 348(3); Whereas the 'official language shall be the language of all Courts of Sessions, Judicial Magistrates, Civil Courts subordinate to the High Court in the State'. But English shall also continue to be the language of the said courts. Any presiding officer whose mother tongue is not the official language of the state may continue to record the evidence in English. One may

make use of such English words and phrases as he/she may think necessary to exactly bring out the purport and meaning of any expression**.** As far as the Judiciary is concerned though the official language of the state and the union have an important role, English text is used as authority since the legal system has heavily borrowed from the English system.

Education: Language is not only one of the important parts of the education system, but it is also the driving force of the system. A multiethnic, multilingual and pluralistic nation needs to evolve language education policies in such a way that all the segments of population that constitute that nation develop a sense of participation in the process of governance and nation-building. In addition, the specific aspirations of the individual segments of the nation need to be met to the satisfaction of the various ethnic, religious and linguistic communities. It has to be noted that the makers of the Indian Constitution did not lay down elaborately the policy for the domain of education in independent India as they did for administration or judiciary. The constitutional law experts (Jain, M.P:1987) opine the same. 'A difficult question arises regarding the medium of education at various levels. The Constitution prescribes no policy or principle, and makes no provision, in this regard. To begin with, the matter was left to the legislative power of the States as 'Education' was a state subject. The States enjoyed full right to prescribe the media of instruction at the primary and the High School levels.' After reorganization of the states on linguistic lines, the states have better understanding of the multilingual situation of the respective state and know the aspirations of the people. So, the makers of the Constitution with broad guidelines allowed the language policy for education to be evolved in the context of their multilingual situation under various rights bestowed in the Constitution, through the process of mutual accommodation, adjustment and adjudication. Since education is in the concurrent list of the Seventh Schedule of the Constitution, the language policy formulation for education and its implementation is left to the State governments under the Constitutional safeguards and broad guidelines. It was a wise decision to allow the states to adopt what they feel good and right for their subjects.

The *States Reorganization Commission* had asked the Union Government to elucidate a policy outline for education in mother tongue at the Secondary stage. In 1952 the *Secondary*

Education Commission, recommended the study of four languages at the secondary stage: (i) Mother tongue (ii) Regional language (iii) link language–Hindi and (iv) one of the classical languages-Sanskrit, Pali, Prakrit, Arabic and Persian. The *All-India Council for Education* recommended the adoption of the Three Language Formula (TLF) in September 1956. The *Education Commission* (1964-66) recommended a three-language formula**:** (a) The mother tongue or the regional language. (b) The official language of the Union or the associate official language of the Union so long as it exists; and (c) A modern Indian or Foreign language not covered under (a) and (b) and other than used as the medium of instruction. In all the cases mother tongue was part and parcel of education. It is to be noted that these 1952 to 1966 formulas were recommendations and not the policies to be accepted for implantation.

The first *National Policy on Education-1968* spoke about the regional languages and the Three Language Formula (TLF) 'which includes the study of a modern Indian language, preferably one of the Southern languages, apart from Hindi and English in the Hindi speaking states, and of Hindi along with the regional language and English in the non-Hindi speaking states' at the Secondary stage. After NPE 1968 came into existence, a study was conducted by the NCERT - *Position of Languages in School Curriculum in India* 67 subject languages in Indian school education (Chaturvedi M G and B V Mohale :1976). They are: Angami, Ao, Arabic, Ardhamagadhi, Aasan Urdu, Assamese, Avesta Pahlvi, Bengali, Bodo, Chakhasang, Chang Naga, Dogri, English, French, Garo, German, Gujarati, Greek, Hebrew, Hindi, Hmar, Ho, Iranian, Italian, Kannada, Karen, Kashmiri, Kharia, Khasi, Khiemnungar, Konkani, Konyak, Kuki, Ladakhi, Latin, Lotha, Lushai, Maithili, Malayalam, Manipuri, Marathi, Mizo, Modern Tibetan, Mundari, Nicobaree, Nepali, Oreon, Oriya, Pali, Persian, Phom, Portuguese, Punjabi, Rengma, Sadani, Sangtam, Sanskrit, Santali, Sema, Sindhi, Spanish, Syriac, Tamil, Telugu, Urdu, Yeimchungere and Zeliang. It has to be noted that not all mother tongues or languages of India were subject languages in the schools at that time.

The language policy of the NPE-1968 was reiterated in the Education Policy-1986. It sa *The National Policy on Education -1986* said that. the implementation of this part(languages) of the 1968 Policy has, however, been uneven. The Policy will be implemented more energetically

and purposefully.' A committee for Review of National Policy on Education-1986 in its final report on December 26, 1990 had said that at the formula level itself 'The three-language formula does not speak of the mother tongue but only of the use of regional language along with Hindi/Modern Indian Languages and/English.' The TLF '… is restricted only to the secondary stage. Consequently, each State decides how many languages and to what degree fewer or more languages should be taught at other stages of education. The result is that different States have different policies at the primary level and at the higher secondary level.'· Also, at implementation level it had said that 'often, the state's offer, in the first, second and third languages more optional than stipulated in the three-language formula, even though the number of languages taught is three, the languages are not those in the formula. The preferred third language in the Hindi state is often Sanskrit and not a modern Indian language- a southern language-though classical languages like Sanskrit do not find place in the three-language formula…There are differences in the motivation for learning of the third language. While there is economic motivation for learning Hindi, in non-Hindi states, the motivation for learning southern languages in Hindi States is largely cultural. This results in lack of uniformity in learning objectives and competence levels in the third language.'

The *National Curriculum Framework 2005* records that: Home language(s) of children, should be the medium of instruction in schools. Where '…home language(s) or mother tongues are … the languages of home, larger kinship group, street and neighborhood, i.e., languages a child naturally acquires from her/ his home and societal environment…If school does not have provisions for teaching in the child's home language(s) at higher levels, the primary school education must still be covered through the home language(s)…Three Language Formula needs to be implemented in its sprit…In non-Hindi states, children learn Hindi. In the case of Hindi states, children learn a language not spoken in their area. Sanskrit may also be studied as a Modern Indian Language (MIL) in addition to these languages. At later stages, study of classical and foreign languages may be introduced.'

It is to be noted that earlier it was home language/ regional language, but it became home language or mother tongue. In multilingual India, language or language related issue invokes emotional, sentimental and legal responses among the people affected due to policy formulations,

implementation, and envisaged minor or major policy changes. Since 1956, after adoption of the Constitution, Indian Courts have faced litigations of various types by the people affected in the natural process of language policy formulation and implementation. These litigations have questioned the abridgement or curtailment of various rights of the citizens. The courts have also examined them at length and delivered judgments. Sometimes, these judgments have made the Governments to look at their language policy afresh taking into consideration the aspirations of the aggrieved people and the ground realities.

The implementation of the TLF was reviewed and the document released in 2000 itself. The National Curriculum Framework for School Education: A Discussion Document released on January 1, 2000, while reviewing the Three Language Formula, states that- 'In a number of states/organizations/ boards, however, the spirit of the formula has not been followed and the mother tongue of the people has been denied the status of the first language … because of the changed socio-economic scenario, the difference between the second and the third languages has dwindled. Thus, in reality, there may be two second languages for all purposes and functions. Some states follow only a two-language formula whereas in some others classical languages like Sanskrit and Arabic are being studied in lieu of a modern Indian language. Some boards/institutions permit even European languages like French and German in place of Hindi.' In this scenario, the three-language formula exists only in our curriculum documents and other policy statements. According to this document the three languages are: (i) the home language/the regional language, (ii) English, and (iii) Hindi in non-Hindi speaking states and any other modern Indian language in Hindi speaking states. These are the major attempts to arrive at a language policy for education and a review of the TLF.

The TLF designated as strategy for language education in schools of the multilingual nation has no constitutional status the acceptance or otherwise of it is totally dependent on the states and its population. The TLF is Macaulay's Education Minute for post-independence India. Major beneficiary of TLF is English becoming compulsory language as one of the school subjects and most sought out medium of instruction from the earliest stage of education. This has contributed for the spread of English education in the country. Another benefit accrues to Hindi, since most of

the non-Hindi states and union territories have made Hindi as language of the school system. Remember TLF is applicable at the secondary level not from primary stage.

The social and political context in which this non-working [TLF] language policy for education was evolved is different from the one that exists in the schools today after 70 years. At that time both Hindi and non-Hindi speaking population was to be kept in good humor and exhibited that they are treated on par and Hindi speakers learn another language and non-Hindi speakers learn Hindi. The first of NEP 1968 ignored the mother tongue and gave roles for regional languages, Hindi and English. This has proved to be grand blunder, in ignoring mother tongue and glamorizing English and to certain extent - Hindi. This gave over riding power to English and people started to crave for it in education. The TLF through schooling has helped in the spread of Hindi in many non-Hindi speaking states. It has failed to spread non-Hindi languages in the Hindi speaking states. This affected language learning as well as learning through the language. Due to the constitutional provisions most of the regional languages got declared as official languages of the states and union territories and made efforts to become languages of administration wherever possible. Most unfortunately all regional languages failed to become medium of instruction at all levels, English continues to rule the field. If the regional languages are not made languages of education at all levels for all even now, their growth is bound to suffer in due course of time.

It is seen that discipline of language education is burdened with terminologies (for the sake of terminologies) -home language, local language, mother tongue, first language, second language, third language, regional language etc. Before further discussion let us retain only the terminologies that are needed and transparent to understand and follow. The following terminologies are sufficient for our discussion: **mother tongue, regional language, first-second-third language**. I would like to clarify that the first-second-third language refers to the chronological order of their introduction as a language in the school education, and nothing less and nothing more. The issue of language education could be looked afresh. It has to be linked to people's participation in both knowledge creation/dissemination and their economic welfare. It has to be an inclusive policy to include all mother tongues and beneficial to all the students.

Important language policy statements from the *National Education Policy-2020* which is in limelight now and the very less debated the *National Curriculum Framework for School Education -2023* on the language policy are extracted are discussed here (Policy statement is rendered in italics and discussion in the normal fonts). The *National Education Policy-2020* proposes that:

'*The three-language formula will continue to be implemented while keeping in mind the Constitutional provisions, aspirations of the people, regions, and the Union, and the need to promote multilingualism as well as promote national unity. However, there will be a greater flexibility in the three-language formula, and no language will be imposed on any State. The three languages learned by children will be the choices of States, regions, and of course the students themselves, so long as at least two of the three languages are native to India.'* (NEP-2020*)*

Imposing a language starts when one says only three languages are part of schooling. Why three languages only, why not four languages? Or why not two languages? Now, the concept and meaning of first, second and third language in school education has disappeared and it does not make any sense at all. Pedagogically first, second, third language etc., refer to the order of their introduction to the child in the schools. For example - Karnataka on Oct 29, 2006 decided to teach English as one of the languages (as a subject) from the first standard itself in all the Kannada medium schools and the schools of the linguistic minorities. In the year 2007, English was introduced as a subject of study in all the government and aided schools from the 1st standard without any training to the teachers and necessary pedagogic preparations that are needed for such an initiative. Now, due to many languages being introduced at the early stage many students are not learning any language well. Like subject components, language components too are learnt by heart. It is not language learning at all. This happens since when the language learnt is not his mother tongue. It has to be noted that hardly anybody opposed this move of the government, including the persons who were opposed to the introduction of Kannada on the ground that it creates a burden on children. In this context, which is the first or second language, which is the second language? English which should have been an additional language in education in India has become a substitute language. Many times, it acts as a substitute for mother tongue, sometimes

substitute for official language of the state and most of the substitute for medium of instruction at all levels of education. Sanskrit has become a substitute language for mother tongue, official language of the state in secondary schools though it is a mother tongue of a few people.

In the original formulation TLF was for three languages in the secondary stage only, not for teaching many languages from the first or second standard itself. The definition and scope of it has been enlarged meaninglessly There is a paradigm shift. Once in Karnataka, from the first standard first language Kannada or some other language, second language English from the middle school and the third language Hindi from the secondary stage.

Now, can we understand that in Hindi speaking states TLF will be Hindi, Sanskrit and English? In non-Hindi speaking states can it also be Sanskrit, Hindi and English? In reality TLF is a threat to national unity since it cannot be implemented uniformly throughout the nation. Attempt to do so will do more harm to the mother tongues and the country. The phrase national unity/integration is being used now to scare the people.

*'In particular, students who wish to change one or more of the three languages they are studying may do so in Grade 6 or 7, as long as they are able to demonstrate basic proficiency in three languages (including one language of India at the literature level) by the end of secondary school…'(*NEP-*2020)*

What level of proficiency? At the end of secondary stage now the students are expected to demonstrate proficiency in three languages at the grade 6 or 7. Is it possible? One should see the annual reports being published by the organizations after the evaluation of the performance of the students to know the field reality.

'There will be a major effort from both the Central and State governments to invest in large numbers of language teachers in all regional languages around the country, and, in particular, for all languages mentioned in the Eighth Schedule of the Constitution of India … Sanskrit will

thus be offered at all levels of school and higher education as an important, enriching option for students, including as an option in the three-language formula….' NEP-2020*)*

Here, Eighth Schedule is used as a list of select languages to help covertly Hindi and Sanskrit. Constitutional Assignment of the Eighth Schedule is (Article 344) formation of the Official Language Commission to make recommendations on progressive use of the Hindi language for the official purposes of the Union, language to be used in the Supreme Court and the High Courts and for Acts, Bills etc., and -language for communication between the Union and a State or between one State and another and 'restrictions on the use of the English language for all or any of the official purposes of the Union.' Another one, the Special Directive in (Article 351) also relates to the development of Hindi. Here, (a) it is the duty of the Union to promote the spread of Hindi, (b) it should develop to serve as a medium of expression for all the elements of the composite culture of India, (c) it has to enrich by assimilating the forms, style and expressions used in Hindustani and in other languages of the Eighth Schedule without interfering with its genius, (d) and also it should enrich itself by drawing vocabulary primarily from Sanskrit and secondarily from other languages.

Thus, the Constitutional assignment is for the development of official Hindi, Hindi for communication across different languages and spread of Hindi across the States and the Union Territories. Attempts are being made to enlarge the scope of the Schedule to make it relevant. One such attempt is the Official Language Resolution, 1968, adopted by both Houses of Parliament. It extended the functions of Article 351. Accordingly, it became the '...duty of the Union to promote the spread of the Hindi language and to develop it so that it may serve as a median of expression.' Simultaneously, '... the Eighth Schedule specifies … major languages of India besides Hindi, and it is necessary in the interest of the educational and cultural advancement of the country that concerted measures should be taken for the full development of these languages'; and '... a programme shall be prepared and implemented by the Government of India in collaboration with the State Governments for the coordinated development of all these languages, alongside Hindi, so that they grow rapidly in richness and become effective means of communicating modem knowledge'. The responsibility for the compliance of this is mainly with the Department of

Education of the Central Government. Since the Constitutional assignment was looking biased towards Hindi, the development of languages of the Eighth Schedule for educational and cultural advancement also was added as the / responsibility of the Union Government.

Since 1968 what has been done by the Union government in this regard needs to be evaluated. Is it not true that development of these languages is left to the state governments? What is done for the stateless Scheduled languages? Now Sanskrit will get an additional booster dose by becoming a language in higher education also with the help of TLF.

'In addition to high quality offerings in Indian languages and English, foreign languages, such as Korean, Japanese, Thai, French, German, Spanish, Portuguese, and Russian, will also be offered at the secondary level, for students to learn about the cultures of the world and to enrich their global knowledge and mobility according to their own interests and aspirations. …' (NEP-2020)

In TLF at secondary stage where and how the foreign languages fit in is not known. In three languages which language is going to get out to make space for a chosen foreign language?

'Wherever possible, the medium of instruction until at least Grade 5, but preferably till Grade 8 and beyond, will be the home language/mother tongue/local language/regional language. Thereafter, the home/local language shall continue to be taught as a language wherever possible. This will be followed by both public and private schools. …' (NEP-2020)

To make the policy of medium of instruction meaningful, this has to be rephrased by eliminating many options thus - 'the medium of instruction until at least Grade 5, will be the mother tongue, Grade 5 to 8 regional language (official language of the state). Thereafter, the student may choose the medium of his choice. This will be followed by both public and private schools. …'. In this context a look at the *Right of Children to Free and Compulsory Education Act, 2009* it says that 'medium of instructions shall, as far as practicable, be in child's mother tongue.' The word *'as far as practicable'* has provided ample scope for the states, schools, parents and others to dispense

with mother tongue medium and embrace the English or some other medium. We are not aware of any mechanism available to verify the implementation of this section of the Act. This act needs to be amended immediately to save mother tongues in schools. In amendment to this Act, these four words *'as far as practicable'* should be deleted and the Act made stronger for implementation. The debate educational or legal hardly considers these language issues in the Right to Education Act.

Indian Sign Language (ISL) will be standardized across the country, and National and State curriculum materials developed, for use by students with hearing impairment. Local sign languages will be respected and taught as well, where possible and relevant.' This is a good development.' (NEP-2020)

NCFSE-2023: *emphasis a. 'The curriculum aims at developing linguistic proficiency for academic use in three languages by age 15 (Grade 10). At least two out of these three languages should be languages native to India. At least one language native to India will be studied at the 'Literature level.'*

At least one among them should be the mother tongue of the student.

'b. At least one language native to India will be offered as an option for the medium of instruction to all students up to Grade 12.'

In this context of discussion on medium of instruction it is appropriate to recollect what had happened in Tamil Nadu. The Government had issued an order on January 13, 1999 that '… at least two out of three subjects, that is, Social Studies (History and Geography), Math, and Science shall be taught through the medium of Tamil, apart from teaching Tamil as a subject in Nursery and Elementary Schools.' When challenged in the Madras High Court, a single Judge, in his judgment on June 7, 1999, held that '… this order is valid only for those students, whose mother-tongue is Tamil. Or in other words … Government order is not applicable to the pupils, whose mother-tongue is not Tamil.' Further a five-member committee headed by Mr. Justice Mohan was set up to '…frame guidelines for introducing Tamil as medium of instruction at all

levels in the Educational sphere from Nursery to Higher education. On the recommendations of the committee the Government issued another order on November 19, 1999 saying that 'In all schools Tamil or mother tongue shall be the first language; in all schools from class 1 to 5 Tamil or mother-tongue shall be the medium of instruction.'

'c. The language in which literacy is first learnt in school (R1) should be a language that is most familiar to the student. Usually, this is the mother tongue of the student or the language that is prevalently used in the neighborhood.'

Here the part of the sentence '*…or the language that is prevalently used in the neighborhood.'* deserves to be removed to make the policy meaningful or else neighborhood language will naturally have the overriding power.

'd. Since it is in R1 that literacy is first attained, it must be used as the Medium of Instruction (MoI) for other subjects, at least until literacy in another language is attained.'

Considering that if R1 is mother tongue the policy could be accepted.

'e. In Grades 11 and 12, at least two languages will be studied, at least one of which is a language native to India.'

This is an extension of the TLF purview to this stage of education. This has to be examined with care along with the data about the current scenario.

'f. Language Education in all these languages would not just aim for oracy and literacy. Students should develop effective communication, discussion, and writing skills in these languages along with capacities for literary appreciation and creative use of language'.

As a goal of language education, it is commendable. Someone/government should take up this as a challenge and experiment in one rural school in each and every state and come up with an

objective assessment. If it is successful, it could be extended as the aim of the country. The NCFSE-2023 makes the intention of the language education policy very clear. Policy is one entity, and its implementation is another thing. Policy has to be not only idealistic but also practical. Need policy modification and honest implementation.

The tables given below provide the information (though out dated) about the number of school languages and the number of languages used as medium of instruction in India as reported by the documents of NCERT. Accurate current information on status of languages in the schools could not be obtained. But the statistics, though old, say something to attract our attention.

Number of School Languages

Year	1970	1973	1978	1986	1993
Number of languages	81	67	58	44	41

Number of Medium of Instruction Languages

Stage	Third Survey 1973	Fifth Survey 1986	Sixth Survey 1993
Primary	51	43	33
Upper Primary		31	25
Secondary		22	21
Higher Secondary		20	18

Between 1986 and 1993 at all levels of school education the number of languages being used as medium of instruction gradually decreased at all levels. The students were going away from the languages they were taught towards some other language/s. The statistics of the survey remained as statistics and did not open the eyes of educational/language planners. Concerted

efforts to investigate the reasons for this attrition and steps to prevent this, seems to have not been taken.

At all levels of school education, the number of languages being used as subject language and also as medium of instruction gradually decreased at all levels. The students were going away from the languages they were taught towards some other language/s. This is the symptom /indication that the TLF has miserably failed long ago in helping Indian languages to become school languages and also failed to retain them in the schools. Instead, it has forced languages to disappear from the school system. It may also be noticed that as the country goes higher and higher in the educational ladder, the number of languages being used too becomes less. The statistics of the survey remained as statistics and did not open the eyes of educational/language planners. Concerted efforts to investigate the reasons for this attrition and steps to prevent this seems to have not been taken.

A mother tongue/language has two roles in education. One is of communication, and another is the role of the medium to learn various subjects/disciplines. Not only language is one of the important parts of the education system, but it is also the driving force of the system. Now there is no need of artificially numbering school languages. Medium of instruction should invariably be one of the school languages. Now, more than seven decades after the independence of the country and more than five decades of the first *National Policy on Education* 1968, we as a nation have failed to arrive at proper language policy for education acceptable to one and all in the multilingual country. We do not think outside the baggage box of two-three formula and hanging on to the failed attempts and try to remain safe by sticking to 'three' of NEP 1968 which at that time itself ignored the term mother tongue though explicitly stated by the *Secondary Education Commission* in 1952 and *Education Commission* 1964-66.

We do not look at the challenging opportunities to change the existing unsuccessful system. The need of this century is *a people-centric* holistic approach and not only nation *centric* patch work approach. Language policy cannot be a cut and paste work. It has to be linguistically sound, acceptable to the people and implementable by the government machinery. The social and political

context in which this non-working TLF language policy for education was evolved is different from the one that exists in the schools today after 70 years. At that time both Hindi and non-Hindi speaking population was to be kept in good humor. The TLF exhibited that they are treated on par and Hindi speakers learn another language and non-Hindi speakers learn Hindi. The first version of NEP 1968 ignored the mother tongue and gave roles for regional languages Hindi and English. This has proved to be grand blunder, in ignoring mother tongue and glamorizing English and to certain extent - Hindi. This gave over riding power to English and people started to crave for it in education. The TLF through schooling has helped in the spread of Hindi in most of the non-Hindi speaking states, it has failed to spread non-Hindi languages in the Hindi speaking states. This affected language learning as well as learning through the language. Due to the constitutional provisions most of the regional languages got declared as official languages of the states and union territories and made efforts to become languages of administration wherever possible. Most unfortunately all regional languages failed to become a medium of instruction at all levels of education. English continues to rule the field. If the regional languages are not made languages of education at all levels for all even now, their growth is bound to suffer.

Need of the Hour - Mother Tongue First-as a Subject and as a Medium of Instruction

The All-India National Educational Conference held at Wardha (Varkey C J: 1940) on Oct 22 and 23, 1937 under presidentship of Mahatma Gandhi had resolved '*That … compulsory education be provided for seven years on a nation-wide scale'* and also *'That the medium of instruction be the mother tongue.'* So far, we have done very little more than parroting the statement that mother tongue medium is the best medium. First language taught as a subject and the medium of instruction have lost their inter-link. Teaching languages from the beginning of the student's career and medium through which the instruction is imported to him have lost linkages. In most cases they have moved in different directions. A student may be learning Kannada as first language, but his medium of instruction need not be Kannada, it can be Hindi or English. We have seen in Karnataka, students opting for Sanskrit as first language for the sake of marks and Sanskrit is not medium of instruction at all. It is essential to re-establish the relation between first language and medium of instruction for better educational outcomes. Strategies have to be devised in our Indian contexts to switch over from the mother tongue medium to the regional language or English

medium in the subsequent stages, since the same medium of instruction is not available at higher levels of education.

Now more than seventy years of independence of the country and fifty years of *National Policy on Education 1968* after reiterating the same regarding language education whenever education policy is formulated, we have understood that our languages are no longer problems but valuable resources to be nourished and properly utilised. But continued over emphasis on the TLF has ruined the language education scenario in the country. Slowly rootless students are being produced by the system, and they are hanging on to the branches of English. Instead of glamorizing a formula as strategy that eludes effective implementation for the past 50 or more years, a formula that has proven to be non-practicable has to be abandoned. A viable alternative a non-hierarchical language plan of action to the TLF for language education in the school curriculum should be worked out. There is a need for multilingual education which protects and preserves mother tongue not an education destined by time proved impractical formulae.

In India the language education debate is preoccupied with TLF, Hindi speaking - non-Hindi speaking states and does not think beyond that. Even after 75 years of independence neither all the 119 languages nor all the 271+ nameable mother tongues have become school languages. Strangely the word mother tongue has vanished as a school language from the NEP 2020. There is singular lack of understanding of difference between mother tongue and language in the Indian multilingual context.

The NEP-2020 repeatedly uses the term multilinguals, multilingualism. Existence of more languages in a geographic territory is not multilingualism. Multilingualism is people knowing and using more languages. It is a double-edged weapon. Due to circumstantial compulsions, education, business etc., people may in addition to their mother tongue learn one or more languages and become bilingual or multilingual. However, in due course of time, he /she may leave mother tongue and embrace the other tongue/s learnt, evidence to this exist in the country. Any such learnt additional language (not acquired in the natural process) should not become a substitute for mother

tongue. India needs additive multilingualism which protects mother tongue and not deductive multilingualism which leads to the death of a mother tongue.

Mother tongue is not merely a communication tool, it is a repository of socio-cultural traits, traditional knowledge systems. A mother tongue can survive and develop only if it is learnt at home and also as part of the schooling of the child. Earlier policy of language education, as already said was *national integration centric* and was aimed at spread of Hindi, English and development of the regional languages. It is necessary to note that Hindi too is one of the regional languages. Language education policy has to be *mother tongue centric* which protects and promotes the mother tongue of the child. In the context of Indian linguistic scenario where all languages are mother tongues, but all mother tongues are not languages one of the suggestions based on the experience of the implementation of previous NPEs is a holistic approach towards language education. It includes Grade I to V- Mother tongue of the student is the subject as well as medium of education. Grade VI to VIII – Mother tongue or regional language is subject as well as medium of education. Grade IX and X - the student is at liberty to choose the subject language and medium of education. Here the question is which mother tongue is medium? The answer is simple-all the mother tongues listed by the Census of India-2011 are to be allowed to be part of Indian school system. This shift of focus from idealistic *TLF Hindi-non-Hindi centric* to down to earth *mother tongue centric*- inclusive language education policy is the need of the 21st century India.

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The Science of Language Laboratory in the Art of English Language Teaching

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Abstract

This study illuminates the optimization of language laboratory for English language teaching. The synthesis of language laboratory with English language teaching is indispensable to demonstrate the functional aspects of the language. It is not a theoretical concept. Language laboratory can work as beacon light in order to implement the rules of physics of the human speech sounds. Adaptation of laboratory in teaching and learning is essential to recognize, which feature of it can be applied to obtain the maximum benefit. The goal of learning is different for every learner. The attainment level of every learner is also different. Classrooms are often diverse in terms of socioeconomic and geography vice versa. Language teacher /instructor must not adopt general study technique for every student because every student is distinctive. It is necessary to be acquainted which teaching methodology is suitable for the students. The significance of linguistics is indispensable to evaluate the role of language lab for English language teaching. Hence, teacher can diagnose and suggest the remedial recommendations for errors in learning by the use of language laboratory.

Keywords: English language teaching, Physics of human speech sounds, English language laboratory, English as second language, language learning.

Language Laboratory: Quintessential

The concept of 'laboratory' emerged in the early 16th century. It denoted to a special structured space for chemicals experiments and medicine composition by the experts of science. Scientists follow the lab manual to do their practical for research purposes. With the advancement the science field, the sophisticated electronic tools were added in the laboratory. The transcendent advancement of computer technology extraordinarily exceeds its reach to the public. The beginning era of computer science was dedicated to the science and engineering purposes, later it introduced to the teaching and learning process, contributing to the significant changes to revolutionize the education scenario.

The language laboratory is a place to teach and learn the language skills especially speaking and listening. Lab contains the audio and visual software used as an ad on feature. Nowadays, Labs is intrinsic part of technical education institution, schools, universities etc. Computer-assisted language learning emerged in the 1980s as a potential tool for teaching English as a second/foreign language as well as for other languages (Hanson-Smith, 1997).

The use of language laboratory was proposed by Stack, as the most effective and feasible way for practising the structure and pronunciation of the foreign language (Stack, 1964).

The first known language laboratory was established at the University of Grenoble. (Roby,W.B. 2004). The during the period between of 1950 to 1990, the tape-based system or cassette was in use. Now modern PCs of the labs are installed with the sophisticated software and gadgets. The early language labs are no longer in use because teacher used to listen and deal with audio connected with wired analogue tape-based system with computer in a set location. The progress for the training and development with the modern facilities was introduced gradually. Students can improve his/her knowledge in the guided atmosphere.

The innovations made in the technology in late 50s, the phonograph, records players, kymograph, oscillograph etc. offered new views to the language teacher and thus the audiovisual method was proposed, which was juxtaposition to, but in co-ordination with and an improvement of the audio-lingual method. It was argued that seeing, believing and understanding the learning becomes familiar with the language. The best results are obtained if the spoken and visual aspects are combined. Thus, films, filmstrips, and tape recording and

usual picture and models are the best means to demonstrate and explicate a passage. The learners are required to see, listen memorize and practice the language features.

The wide range of software imparts the training from simple to advance level courses for the students. Lab enhances the efficiency of speaking as well as reading. The foreign universities requires scores in the IELTS, TOEFL examinations for the admissions, so students feels feasible to adapt the language lab for accent learning.

The role of language lab is more considerable for ELT in common and communication skills in particular. The advancement in technology promoting the European models of teaching and learning, consequently the need of language laboratories in the education institutions is unavoidable. The components of the English language critical analyze the adjustment of language labs in the multilingual country such as India and strive hard to get maximum output for the betterment of the student. Language skills like speaking and listening are the basic skills for the learning of the English as second language.

Learner grasps the knowledge through these skills. Science suggests listening is the only skill, which human being initiate to develop before birth. Listening practice promotes the competence on other skills. The classroom teaching, students are often paid less attention because the lack of facility. It is also observed while designing the syllabus much emphasis is not given to language skill. Even teachers are unable to satisfy the necessities of students due to insufficient technical knowledge. These limitations can be succeeding over by the use of language laboratory.The last two decades have seen phenomenal progress in software to revolve the sphere of language learning through the dynamism of sophisticated technologies.

Modern Language Laboratory Synchronizes:

- Digital Disks, audio/video tapes, program softwares install in the PC booth.
- Computers connected to the server are set up to store the information.
- Software organizes with the local area network (LAN).
- Audio- Visual facility to be proficient in language.
- Teachers and Students are provided headphones for listening and speaking.
- Screener and Projector

English language lab is systematic arrangement of computers and machines that are facilitated with software. Each computer functions as booth, which helps to learn the communication in order to carry and receive the information. Software programme are created to learn language skills in systematic method.

Salaberry (2001) argues, "Videos expose students to authentic materials and voices, dialects and registers other than the teacher's and provide cultural context".

English Language laboratory focuses on the methodology of LSRW skills that are listening, speaking, reading and writing. laboratories endow with the rich resources to the learning of the students. Teacher carefully examines and evaluates the practical knowledge of the students. It is essential to have making aware about the software to make the optimum use. Language laboratory provided the outcome base learning so that the learning process grooms the holistic approach. The language laboratory can also use for the soft skill training and development at advance level. The program software comprises a wide range of courses like art of speaking, interview skill, nuances of speech delivery, problem solving vice versa. that develop the psychological attributes of the students. These modules will help the students to deal with the situation at the workplace. Program software develops the language proficiency with the use of technology to makes learning more enthusiastic as well as interactive. The sense of behaviour of students is creative when they learn in a different atmosphere. LSRW skills are developed in the students through a systematic process, first of all, teacher emphasize to pay more attention on listening aspect, and students are expected to listen the interactive audio/videos tapes and then practice speaking skills. Remaining other skills i.e. reading and writing are later task of the learning process. Teacher may assign self-assessment for the evaluation of student's comprehension of the English language.

Why Do We Need Laboratory for English Language Teaching?

There is acute need of language laboratory for the teaching and training of the students in the functional aspects of English. For instance, "We have not been taught the majority of words which we know…" (Carter & Nunan, 2001, p. 46).

The necessity scale for language lab is growing day by day due to much emphasis on the practical aspects of English. It endows with a significant platform to learn the skills and other

accents accessible through the software. Students can solve their queries online without any uncertainty. Lab manuals rectify genuine training to the students to learn the English as second language. Students search out for more interactive learning than normal classroom learning. Therefore, the optimization of lab for the teaching is made interesting and it depicts more consideration to the students.

"Teachers are more beneficial by lab in terms of writing skill. It is a tedious and time-consuming task. Computer checks every small error perfectly and give correction instantly. It is also possible to mark any learners repeated mistakes and can give remedial teaching" (Shukla 83)

"The three reasons that the knowledge base is so limited and scattered are each related to a different piece of the puzzle: inputs, process, and outcomes. The first reason is an overemphasis on access as a key objective of technology policies in education. The second reason derives from the methodological challenges that the investigation of the teaching and learning processes poses, in particular in relation to the role that technology plays in the improvement of student outcomes. The final reason is the poor understanding of what the issue about the effects of technology in education really is and how to address it." (Dutta pp. 136 - 137)

Noam Chomsky (1957) put forward the idea that humans are in nature predisposed to create and use language. Chomsky christens this hypothesis by the term "language acquisition device" (LAD). Chomsky further discussed; humans have the naturally born ability to acquire the language. The ability to learn the language and actual use of it is the matter of competence and performance. The laboratory is well equipped with the linguistic significance software. Linguistic competence is basic elements of language (phonology, lexicon, sentence patterns, and morphological inflections (Celce-Murcia & Olshtain, 2001, p. 16).

The influence of Chomsky in contemporary second language teaching is notable especially to develop the mentalist approach. Natural approach is evident enough to describe the teaching methodology.

The acquiring of language skills is vital for the learning of English as second language. Due to clarity of speech transmitted through the software, students can able to grasp it easily. Teachers paid much attention on speaking or oral drilling of the words. For the further study, they can read and practice these words at home. The last and important step of learning is writing skills, which will students acquire gradually. Most of the world population is bilingual. English fills the created vacuum whether as second or foreign language of most of the countries of the world. English is expanded across the globe. The most common language of the world. The learning of English is to obtain a new vision to make a glance at the world with a fresh outline. English is a global language hence it applies different form in different country; the prominent difference is between American English and British English; the structure of some words are different for same meaning in both the countries. For good wishes and general communication, 'Hello' is popular in British English and 'Hi' in American English. Some words are also deviate in spellings in both the countries as 'programme' in British English and 'program' in American English. Language lab can be a helping hand for all practical aspects of teaching and learning but most effectively, we can use in teaching of Interpersonal and Organizational communication. Computerized guidance and human guidance can make you conscious about communicative aspects. Sentence making, vocabulary building, pronunciation and grammar help in speaking and writing. While acquired an excellent language skill it is very important to present the message in a formal and meaningful way. Communication is all about how learner asserts it.

If a person cannot communicate the message with the significance of syntax and semantics, the decoder will be unable to respond thus the process of communication will remain incomplete. These instructions of communication can be simply taught by various activities in language lab like dialogues and conversation. English language lab is also opens up resources to learn the technical writing skill. Technical writing in English is used for the business purposes. The nature of technical writing is concise, simple and lucid. However, the recent industrial and technological progress unblocks the new path of human capabilities to explore the conscious development of technical skills. These types of communication is dynamic and requires theoretical and applied knowledge of the interdisciplinary subjects such as Psychology, Sociology, Computer science, Business Management etc. The need and application of technical communication can be bring the light in a multi-lingual country, it is hoped that the students will use the lab utility in full measure to get benefit in practical life.

English language can uplift the career of the students whether it used in academic or business purposes. The learners shall focus on the aspect of English language skills with the help of laboratory software. It will not merely develop their knowledge but also enhance their confidence while concern for the jobs. The advanced institution feels the importance of the cutting-edge technology in Education. The teaching and training of English by using lab prepare the students to all walks of life.

Facilitates Teacher to Prepare the Student for the Interview:

- Develop the Course contents are virtually.
- Orientation of the students to the nuances of speech sounds, intonation, pronunciation
- Software credentials and other technical certification.
- Training programs for the communicative skill.
- To make aware the students for competitive examinations, quiz.
- E- content development
- Refresher courses are developed.
- Assessing the speaking and listening
- To bring confidence among students to develop language skill.
- To make efficient in spoken English and neutralize interference of mother tongue

Teaching Interview Skills

Interview is the oral examination. Interviewer asks relevant questions to the interviewee and the interviewee is expected to provide the answer. Time duration for the Interview length is often not pre-defined. An intelligent learner who is good at speaking can put his place in this competitive procedure. Candidate has to pass interview to get the job. After the completion, of course the main aim of a candidate to perform well at workplace. The use of language is to transmit the information successfully and to convince the audience. This interview presentation includes 'Facial Expressions' as it is the mirror of the knowledge and confidence of the person. A smile locates the responsiveness, raised eyebrows stand for scepticism; tighten jaw associated with antagonism, and so on. The face transmits information that may show low confidence, nervousness, recognition, hesitation, and satisfaction in immediate progression. Therefore, it is important to organize them. The teaching of interview basics

through the language lab enhances and grooms the personality and subjective knowledge of the candidate as well.

> *"Many Indian students also suffer from low confidence in their use of English because it is not the language, they are most comfortable in. This feedback is evident from the written responses consistently given by companies like Mahindra and Mahindra Ltd., Essar Group, Jindal Steel Ltd. and Tata Refractories Ltd. to the Training and Placement Centre of our institute during the recruiting process which takes place every year."*
>
> *(Mohanty 66).*

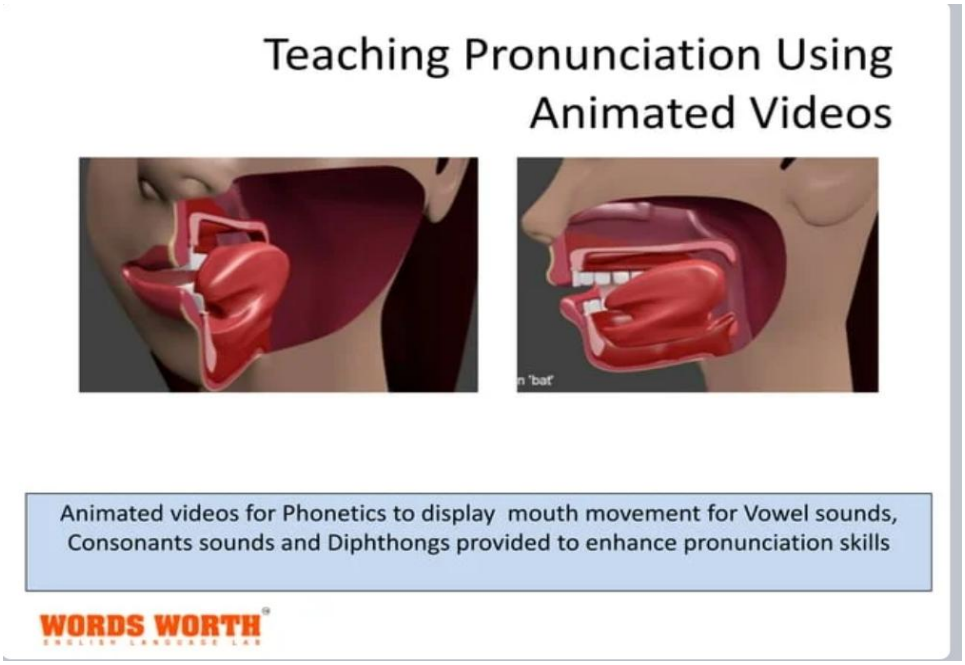
Physics of Human Speech Sound

The physics of human speech sounds imply matter and form. This notion is speech sound is objective and autonomous. Phonetics is the science of speech, which demonstrates the physiological actions to produce the speech signals. These signals are quickly flow from the vocal cavity inside the throat, mouth, and nasal route. The rational analysis is that learning to speak a language entail simply managing the muscles that move the lips, jaw, and tongue. These anatomical formations are feasible to observe in the speech sound production. However, the process of speech production is far more intricate than it may seem. It involves the coordinated activity of nearly a hundred muscles, which exert precise and continuous control to generate the sound waves that convey speech (Lenneberg, 1967). These sound waves are produced through a complex interaction of three factors: (1) the outward flow of air from the lungs, (2) modifications of this airflow at the larynx (commonly known as the Adam's apple or voice box), and (3) further adjustments caused by the movement and positioning of the tongue and other structures within the vocal tract.

Phonetics focuses on analyzing the speech sounds found in languages worldwide. It seeks to understand what these sounds are, how they form patterns, and how they vary in different contexts. The primary task of a phonetician is to observe and identify what happens when people speak and listen to speech. (Ladefoged, 1982)

Phonetics, the scientific study of speech production, encompasses both the structure and patterns of sound waves (Acoustic Phonetics) and the mechanisms by which they are

generated in the human vocal tract (Articulatory Phonetics). Physiological Phonetics, sometimes considered distinct from Articulatory Phonetics, specifically examines the nervous and muscular processes involved in speech. General Phonetics refers to the universal principles and methods for analyzing speech across all languages, distinguishing it from a more specialized branch focused on the phonetic characteristics of a particular language.



Courtesy: Words Worth English language Lab

The era of late 20th century notable linguists would have agreed phonetics is an actual discipline of science. Today great deal of phonetic research applied to the computer-related work. Same as the biological sciences, phonetics as an area of study is phenomenal. This phenomenon may be categorized into the various segments of the language. People's need of expression is only possible by means of communication. The applied perspective of language lab and the use of phonetic rules for the teaching is need of hour.

At its core, the speech signal consists of a rapidly changing sequence of sounds generated within the throat, mouth, and nasal passages, which then project outward through the mouth and, at times, the nose. A common assumption is that mastering spoken language simply involves controlling a few muscles responsible for moving the lips, jaw, and tongue, as these are the most visible. However, the process is far more intricate. In reality, over 100 muscles work in coordinated and continuous motion to produce the sound waves that form speech (Lenneberg, 1967).

a. Voice modulation is the art of using our voice in different way. It is the part of paralinguistic features of the language. We utter the words in unique style of and that our trademark. Paralinguistic characteristics of the language are non-verbal sign that help you to give an importance to your voice.

b. Quality of tone is a distinctive attribute of our voice, which is the gift of a vibrate mechanism. It may be affluent and resonating, soft, thin and nasal, or harsh and irritating. Students can listen the voice quality of the speeches and lectures of experts to make a conscious attempt to develop their quality of voice.

c. Volume is the softness or loudness of the voice. Learner's voice must always prompt but need not to be loud for all time. Person can adjust his/her voice according to the need of task. Students are expected to rise and fall of the volume to make their voice lucid and audible.

d. Pace of speaking refers to the number of spoken words per minute. The pace of speaking is different from one person to another, and it ranges from 90 to 250 words per minute. The standard rate of word production is from 130 to 150 words per minute. How to increase pace and how to get slower in speaking, it is a matter of practice. Commentators fasten their pace when a player hits six or four. It influences the audience. To pass on a peaceful and important message we should take pauses. To make our talk effective we can practice on computer and can record our speech to monitor the change.

e. Pitch deals with vibrations as per second of voice in the vocal cord while producing the speech sound. The rise and fall of the voice can be seen on the display of the computer in the language lab. A balanced pitch outcome with an apparent and efficient tone.

f. Articulation of speech is associated with the sound articulation. It deals with the speaker's competence to produce and distinguish sounds as slop, slur, chop, truncate, or omit sounds between words or sentences. If the sounds are not produced properly, the flow of comprehension is interrupted and prevent the listener from grasping the sense of the message.

g. The Pronunciation is inseparable part of phonetics. Pronunciation is the pre-defined rule of the language to reveals how a word should be pronounced correctly. The big issue for linguistically novice learner is to prevail over from the encounters with the different sound pattern of English. English has some exceptional sounds, which are not universal in other languages. The major problem appears before the Non-native teacher is to pronounce the sound properly. Hence, student does not obtain opportunity to listen the accurate sound so how will he be able to produce the same sound. Therefore, to overcome from this hindrance, the lab is pivotal to listen the actual sound to train the students.

Teaching of Language Skills

Linguistic theory primarily examines an ideal speaker-listener in a perfectly uniform speech community. This individual has complete mastery of the language and is not influenced by factors such as memory limitations, distractions, shifts in attention or interest, or errors—whether accidental or systematic—when using the language in actual communication (Chomsky, 1965: 3).

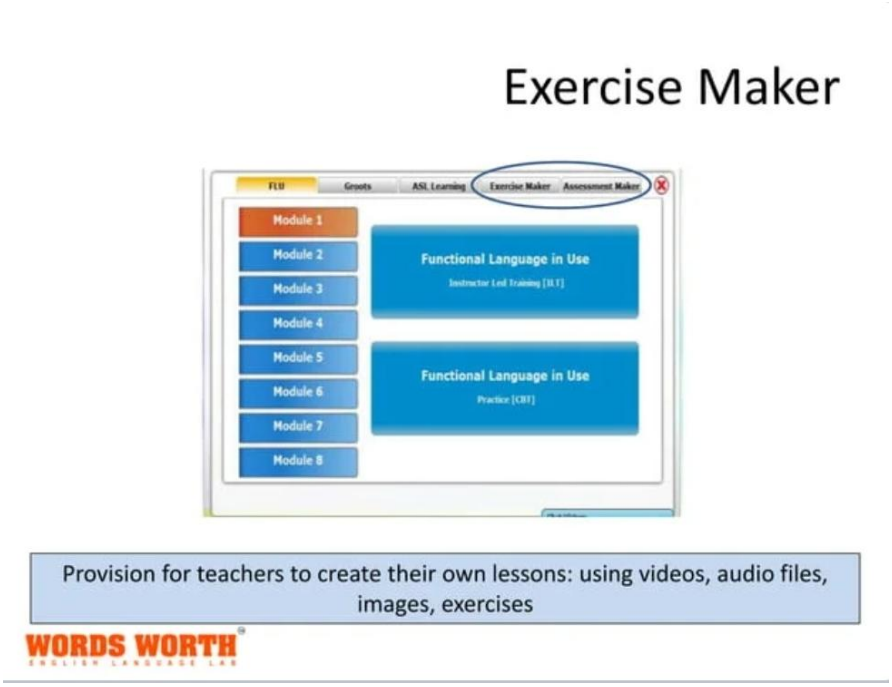
With the advent of phonetics and international co-operation the reform movement got started. Sweet magnum opus published his practical study of language in 1899, and Jasperson book how to teach foreign language in 1904. Victor also held a series of summer schools, which were also attended by then a young student Daniel Jones. All these scholars are associated to the reform movement and this movement has three basic principles: the primacy of speech, the core is text and the priority of an oral methodology in classroom. Methods based on the spoken language would reduce homework and thus relieve mental stress and provide a free environment to learn the students effectively. A method is the reflection of language teaching theory.

The reform movement is path-breaking school that argue phonetics is more than a system of transcription. A language teacher must know the sound system of the second/foreign language. He should also understand the physiology of sound and the proficiency. Thus, the spoken language is considered as the part of the linguistics. It is the structural organization of distinctive and significant sounds. It is science in its own right.

A method is the thought of as plan to put the approach into effect or practice and a technique is the actual risk or action observed in the classroom. The method can adopt the combination of other methods such as mimic memorization or pattern practice. What a teacher does in the language laboratory is – use of digital resources, such as display of objects, use of software, audio-video tape and other gadgets for the rendering of the text and speech.

The prominent aspect of ESL teaching and learning is imparting the knowledge of all the four skills of English. While teaching the each skill the objective of student may be different. Many teachers may ignore this aspect or feel uncomfortable to control the sequence to teach the skills in true sense and in exact stability. The teaching of all skill must be done step by step. The first step is to teach listening followed by speaking, reading and writing respectively. The teacher, if changed the steps for teaching then the result-oriented outcome cannot be produced. The listening skill is not easy to teach in the multilingual country such as India. Most of the schools in India, more emphasis is given to the teaching and learning the writing so it is much reversed to acquire the communicative competence. The difficulty appears before the teacher is the lack of training to teach the resource of communicative competence for the students. The teacher felt that very rarely learner is exposed to speaking skills for plenty of time. Learner speaks wrong sentences, if the teacher pronounces incorrect words. Lab is foremost useful in teaching speaking and listening skill. Listening is the basic skills for language teaching and learning.

The speaking is a productive and listening is a receptive skill. Learner utters and receives the information through these skills respectively. The Science advocates this is listening is the sole skill, which a human being starts to develop before birth. Listening practices promotes to the excellent competence on remaining language skills. The conventional language course work focused merely on the listening skill. On the other side of the same coin, Speaking is dynamic skill. Teacher expresses to reveals its components to train the students by using the interaction in communication with the students while speaking. Language speaking is utmost needed the actual accent and its use in conversation.



Courtesy: Words Worth English Language Lab

Pronunciation is defined as "the production and recognition of meaningful sounds in a specific language to convey meaning within its context of use" (Seidlhofer, 2001, p. 56). While accurate pronunciation plays a crucial role in communication, excessive focus on pronunciation drills in language labs has shifted attention toward meaning-based approaches. The ability of clear pronunciation requires in depth knowledge of grammar, vocabulary and phonetics as well. The traditional classroom setting composed plenty of students, so it is difficult to motivate them for oral practice. The listening skill came before the speaking. If the students are not exposed carefully to the listening skill, then less proficiency develop in speaking skill. The useful method to teach speaking is to do the drilling exercise in which teacher speaks the word or sentence, the student will repeat it again. During the drill exercise, if the student makes the error, the teacher should diagnose and make the correction. The teacher can follow the some sample words for the teaching of pronunciation and word stress pattern by the use following exercises in the language lab.

Example - Look at the difference between two same words as below.

(1) Communicate (2) Communication

Underline letters as above are stress while speaking.

English language pronunciation is very significant. Teacher can diagnose the incorrect pronunciation commit by the students then it can improve by the proper use of language lab. Students may assign for the error-finding task. Instructions pertaining to the diphthongs, plosives, fricatives, nasals can be taught by demonstration on the screen of the computer. Lexicons can be divided into the small chunks. These chunks while producing with a single chest pulse is termed as syllable. Language learner practices syllables to be acquainted with stress patterns and classification of the syllables. The speech producing words in terms of syllable syllables are monosyllabic, bi-syllabic, tri-syllabic and polysyllabic. To get mastery over this skill another next skill is reading. The reading is concern with the decoding of written symbols. This proficiency is a 'Graphic Motors' skill and a receptive skill as well. Reader uses visual and psychomotor organs. Reading is usually measured in Words per Minute. While starting the learning of English as second language WPM is very slow and can be developed by the practice. Students in language lab start reading practice with instruction. These instructions are essential to understand the sense, theme and meaning of the paragraph. Reader reads the written content then decodes it on by following cognition. Namita Roy elucidates reading in titled book English Language Teaching as:

> *"In reading, the major emphasis is on the identification of sound, symbol correspondences so that students perceive in graphic form, the meanings with which they have become familiar in oral form. Reading is an integrated part of language study, not a specialized activity. Reading helps the student to coordinate their eye movements, to link symbols they are accustomed to hearing to those they see in print, to recognise grammatical units, to learn the spelling of a statement through the signals and symbols used in it." (Roy 34)*

Reading skill requires more attention to avoid the errors in order to teaching and learning the language. Reading techniques are associated with the reading of the lines and grasp the meaning and structure. Skimming method is peculiar to read the general observation of the text. This sort of reading shows a sketch of the text. The students read to get the theme of the text quickly. The scanning reading is different, in which the explicit details is requisite. The

reader does not know the conclusion or summary of the text. The method of scanning reading done for the search of particular word or specific information. The critical reading process is related to get the detailed information. The critical reading is significant to interpret the explanation of the text. It is the extensive evaluation that is also consider as fact-based analysis of the text. Teaching the functional notation of the language skills is the pre-requisites for student's learning. Thus, the last step for the teaching is writing skill. It is an active skill and productive as well. Writing is aligning to the psychomotor proficiency.

Writing skill involves the words selection, and competence to construct the grammatical correct sentences. Writing is based on learner's cognitive process. Writing demands more attention on the vocabulary, idioms and grammar to represent the expressions in a simple and logical way. Writing is used for formal communication so it requires maximum care as minor inaccuracy can be a everlasting for the further study. The writing must be clear and precise in which the infinite use of finite means taken place. Analyzing the target audience is essential while writing. The initial exercise in language lab is to introduce about the punctuation marks. Lab can be instrumental to reduce the error in writing.

Non-verbal Communication

The teaching of nonverbal communication is very difficult task in a traditional class. There are different types of nonverbal sign and symbols, gestures or facial expression which teacher cannot easily illustrate. The appearance of non-verbal elements may differ according to situation and person. Non-verbal communication is very essential to teach as words may transform in every language but most of the languages have common nonverbal communication. This system of communication is natural and spontaneous which deals with the representation of language via sign and symbols. Kinesics is the study of visual aspects and their interpretation, proxemics is the space to convey the effective message during communication, paralinguistic features are the vocal feature are examples of body movements. The verbal medium of communication share approximately 45% of the socio-cultural meaning of any situation but 55% communication happens on the interpretation of non-verbal characteristics. Communication needs strong feedback from the encoder and decoder. Therefore, due to the visual facility, language lab is the most appropriate place to teach this subject matter. Kinesics is concern with the visual aspects of facial expressions so it can be taught through demonstration or videos in the language laboratory.

Difficulties in Establishing, Maintenance and Servicing of Language Lab in School and College

Establishing a language laboratory in schools and colleges is admirable initiative, but it also comes with many difficulties and challenges**.** To establish a modern language lab in schools and colleges are requires investment in hardware (computers, headsets, recording equipment), software, and furnishings. Especially in public or government-funded institutions, budget constraints may be the issue. Despite all these things the teachers often lack training in using language lab software or equipment effectively. Some faculty may prefer traditional teaching methods and resist integrating new technology and innovations. There is very challenging task before the teachers to integrate the Language lab with the curriculum to Ensuring that lab sessions align well with the syllabus and learning objectives. To establish the English language lab at school / college level, there must be specialised teachers recruited which should be well versed in scientific tools and their applications. In India, most of the colleges / schools are in the rural and semi urban areas so the accessibility of Electronics devices, internet connectivity; technical experts are the major issues. Maintenance is also the big issue due to the lack of reliable technology. The lack of availability of expert in the rural or remote areas disrupt the compatible software that aligns with the curriculum and securing proper functioning may obstruct the learning.

Some Observations on Using Language Lab in Schools / Colleges

In the school language lab, where teachers may entrust the assignments to assist students in order to groom their knowledge and fluency in the English language, students can do level based activities. In addition, keeping open to the requirements of the students can help to increase their interest in language study as well. Students can strengthen their language skills i.e. (LSRW), soft skills in English through the adaptation of English language lab software in college. English Language Labs improves the student's skills and practical knowledge of the English language so they can make themselves as par the pre- requisites of the employers.

The use of language labs in schools /college level

to enhance students' language learning skills has several advantages.

Some of them are displayed as below:

a. Students' cognitive abilities are enhanced by learning a new language.

b. Enhances students' ability to interact to develop the inter personal communication.

c. Modify the learners

soft skills, vocabulary, phonetics, reading, writing, speaking, and listening.

d. Introduces students to innovative activities and technologies.

e. Enhances the student's self-control and ability to make decisions.

f. Improves Students' Problem-Solving Skills as well as critical thinking.

g. Increases the student's networks of communication.

h. Stimulates students' creativity through the use of novel communication channels.

Conclusion

English language teaching in non-native country such as India is not an easy walk. The classrooms are diverse. India is such a multilingual and multicultural Nation. Language laboratory makes teaching method practical to get the observable data. Teachers can investigate the facts and rules of language for the teaching of English as second language in India. Language laboratory is acquiring refined technology to sustain and deliver more outcomes. The educationist may mull over the reports of University Grant Commission in which the experts recommended the use of technology in the teaching and learning. The hand on practices of technology is necessary for the teachers to make better use of it for the enhancement of the knowledge of the students.

Language lab works on the practical approach to dissect the language structure. Material and lessons produced once can be used many times in accordance to the need. Trainer can classified the learners in separate batches and conduct examination as per the defined schedule. After completing the exam, the results will be generated automatically, providing a fast, accurate, and efficient evaluation for both trainers and students. This ensures an error-free and timely assessment. Additionally, learners will receive individual scores for each section, allowing for a more detailed understanding of their performance. This method is also beneficial for remedial teaching, as trainers can identify areas where students struggle and provide targeted support. If the lab activities are well-structured and clearly understood by the trainer or teacher, learners can develop proficiency in all aspects of the language. By following, the manual given for hands-on practice of language lab, a person can achieve excellent result. Although, Language lab is an inseparable means for every English language teacher yet it has some limitation too. Lab paid much attention on listening and speaking. The

other remaining skills and grammar part is less approached. The interaction between student and teacher lack the feedback so in this case role of the teacher should be responsive for the immediate remedy of the mistakes committed by the students.

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STUDYING THE ADJECTIVES OF TAI-PHAKE, AN ENDANGERED LANGUAGE OF ASSAM

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ABSTRACT

An endangered language is a language that is at the verge of extinction for factors like its speakers' shift to another language. Language endangerment is a major concern of contemporary world. History and culture of a particular society is passed down through its language. Due to this, when a language dies, it may take with it important information about the early history of the community. Language experts and linguists are working closely with communities of endangered languages around the world in an attempt to preserve these languages. They are trying to offer help with language documentation, maintenance, and revival so that even if the language dies due to some reason, the knowledge of the language will still survive. Tai-Phake is one such language of Assam with a speaker of around 2000 (17th edition, Ethnologue, 2013). It is one of the six languages of Tai- kadai language family. Till date various researchers and linguists have worked on this language. However, it is still comparatively lesser studied and lesser documented language of Tai- kadai language family. In this paper an attempt will be made to give a detailed description of the Adjectives found in Tai-Phake. Adjectives are described as expressions *that alter, clarify, or adjust the meaning contributions of nouns*. They are used in the grammatical classification of words to refer to the main set of items, and they specify the attributes of nouns. This paper presents the semantic protypes of adjectives. This paper will also touch upon adjective reduplication process available in this language.

Keywords: Language endangerment, adjectives, Tai- phake

1.1 Introduction

Endangered language, also known as moribund language is *a language that is at risk of disappearing as its speakers die out or shift to speaking other languages* (Wikipedia.) Even though death of a language is a pertinent issue throughout human history however at present, they are disappearing rapidly due to various interlinked socio- economic and socio-political factors like globalization, migration, cultural replacement, imperialism and neocolonialism.

Ethnologue's 2005 survey of world languages gives a total 6,912 languages, of which 32.8% (2,269) were in Asia, and 30.3% (2,092) in Africa. Out of these languages many of the lesser-known languages are being replaced by other dominant languages that are more widely used in the region or nation. For example, in USA English replaces many native languages, the way that many of the regional languages of India is replaced by dominant language like Hindi. If this situation continues 80% of these endangered languages may vanish within the next century. Today, there are many such languages that are no longer being learned by new generations of its speakers and eventually these languages will become extinct with the death of its last speakers.

UNESCO's *Atlas of the World's Languages in Danger* categorises 2,473 languages by level of endangerment. In this work, UNESCO has presented six types of endangered language.

- Extinct: These are the languages that has no speakers left
- Critically endangered: These are the languages used by the grandparents and older, and they speak the language partially and infrequently
- Severely endangered: Such languages are spoken by grandparents and older generations. While the parent generation may understand it, they do not speak it to children or among themselves
- Definitely endangered: Children no longer learn such language as mother tongue in the home.
- Vulnerable: Most children speak the language, but it may be restricted to certain domains like home.
- Safe / Not Endangered: Is spoken by all generations and intergenerational transmission is uninterrupted

Though there is no definite parameter for identifying a language as endangered, UNESCO's 2003 document entitled *Language vitality and endangerment* outlines nine factors for determining language vitality:

1. Intergenerational language transmission
2. Absolute number of speakers
3. Proportion of speakers existing within the total (global) population
4. Language use within existing contexts and domains
5. Response to language use in new domains and media
6. Availability of materials for language education and literacy
7. Government and institutional language policies
8. Community attitudes toward their language
9. Amount and quality of documentation

Worldwide there are many languages having thousands of speakers but are endangered because new generation of children are no longer learning the language or may be because its speakers have shifted their affiliation to other dominant language. This is the case with Tai- Ahom language of Assam. It is a language of Tai- kadai language family. Now *more than a million people claim Tai ethnicity. However, over ninety-nine percent of these are Tai Ahoms who no longer maintain Tai as a spoken language*. This language is used only during religious function, marriage etc. as it got replaced by other dominant languages of Assam.

The Tai-Kadai language family consists of six language communities- Tai-Ahom, Tai -Khamti, Tai-Turung, Tai-Phake, Tai-khamyang and Tai-Aiton. Among these, Tai-Phake is comparatively lesser studied and lesser documented. Moran (2010) finds only 1426 Tai-phake speakers in the nine Phake villages of Assam which also indicates that this language is in the verge of extinction and needs immediate attention. Moseley, C. (2010) also categorises Tai-Phake as severely endangered language. This can be verified by Intergenerational language transmission factor given in Language vitality and endangerment (2003). Tai phake is a severely endangered language as this language is mostly used by the grandparental and older generations. On the other hand, in the parameter of language use within existing contexts and domains Tai-phake has third degree of endangerment which is ‘dwindling domains’ as the

language is used in home domains and in some ceremonial functions only. Currently, even home domain is penetrated by other dominant languages.

In the parameter of availability of materials for language education and literacy Tai phake comes under group two which indicate that in Tai Phake 'written materials exist, but they may only be useful for some member of the community, and for others, they may have a symbolic significance.' This language is not a part of the school curriculum. This language follows the Tai script and has a unique syntactic structure. It is an agglutinating language. It has monosyllabic morphemes (Edmondson and Solnit, 1997 a:7). There are16 consonants and 09 Vowels in this language (Moran 2010). This paper explores the Adjectives of Tai Phake language.

Adjectives are described as expressions 'that alter, clarify, or adjust the meaning contributions of nouns''. They are used in the grammatical classification of words to refer to the main set of items, and they specify the attributes of nouns. Linguists have given four characteristics for defining this word class in English language.

- They can occur within the noun phrase as modifiers of their head nouns and function in the 'attributive' position. For example: the beautiful girl.
- They can occur in the post-verbal or 'predicative' position. For example: the girl is beautiful
- They can be pre-modified by an intensifier like very. For example: the very beautiful girl
- They can be used in a comparative and superlative form, either by inflection or periphrastically.

Dixon (1991) in his work presents ten semantic types of adjectives in English language. Abbi (1992) add two more types of adjectives to this list. This list with twelve semantic prototypes is given below:

	Semantic Types	*Examples*
1	Dimension	big, great, short, thin
2	Physical property	hard, strong, clean, sick
3	Speed	quick, fast, slow, sudden
4	Age	New, young, old, modern
5	Colour	White, black, red, blue
6	Value	Good, bad, strange, odd
7	Difficulty	Easy, difficult, tough, simple

8	Qualification	Definite, possible, normal
9	Human propensity	Angry, happy, eager, clever
10	Similarity	Like, unlike, similar, different
11	Taste	Sweet, sour, bitter, hot
12	Quantifiers	Two, twice, both, same

1.2. Literature Review

Bandhumedha, B. (1987) in his work *The Phake-English-Thai Dictionary*, a key work on Tai Phake. The dictionary was a collaborative effort with Phake informant Ai Ney Ken Gohain. It aimed in describing the phonology and tonal system of Tai Phake.

Buragohain, Y. (1981) and (1998) listed the Tai divisions of time and presented Phake texts with a non-phonemic "transliteration".

Gogoi (1994) in his PhD work on *Morphological Study of the Tai Phake Language* presents a comprehensive study of the tonal differences that exist in Tai Phake language.

Gohain, A. K. (1991) is a valuable sketch of the socio-linguistics, phonology and syntax of Tai Phake, which Aimya Khang spells as <Phakae>. Aimya Khang Gohain (1991 :47) discussed the phonology of Tai Phake. He writes '*The one-time mighty Ahoms have lost their language. So also the Khamjangs and the Turungs. They still have a chance for revival or at least regain to some extent their lost language through the Phakaes, and also the Khamtis and the Aitons. The Phakaes are also now in the threshold of being lost, unless the Ahoms and the Government come to help.'*

Gohain, A. K. (1997) is a text book for teaching Ahom script but with Phake tones and grammar. Words are introduced in Ahom script with a tone mark in Assamese and then the meaning in Assamese and English.

Kingcom (1992) is essentially a comparison of Tai Phake with Standard Thai, which is his own native variety. There is a data set of 495 sentences which were presumably elicited and compared with Kingcom's own variety (Standard Thai).

Morey, S. (2005) in his book *The Tai Languages of Assam- a Grammar and Texts* presents a descriptive grammar of the Tai languages of Assam. This work includes a comprehensive information on Tai -Phake language.

Sharma ,T. (1982) is essentially an anthropological study of the Tai Phake, and does not claim to be a linguistic study. He did, however, reproduce a number of texts, with translations. The translations appear to be good, but the transcription of the Tai Phake missed both vowel and tonal distinctions.

Wilaiwan (1983) on Tai Phake Word Order**,** observed an ongoing shift in word order from SVO to SOV. Wilaiwan observed that Tai Phake was in a state of changing from SVO to SOV. As for present-day Phake, the form of the sentences is both SVO and SOV, but if we study the old manuscripts, we find the order SVO only.

1.3 Objective of the study

1.To give a detailed description of the Adjectives found in Tai Phake.

2. To throw light on the semantic protypes of adjectives.

3. To touch upon adjective reduplication process available in this language.

1.4 Methodology

The data for the present study is taken from both primary and secondary sources. The primary source includes data collected through interviews and questionnaire given to native speakers of Tai-Phake. For secondary data various reference books, newspaper, journal etc. were consulted.

2.1 Adjectives in Tai Phake

The ways of categorising word classes in Tai- Phake language is a problematic one. Realising this Grierson argued that he could not 'divide the vocabulary into parts of speech' (1904:73), and added that: 'As to what function each word performs, that is determined partly by custom. Although, theoretically, every word may perform the function of any part of speech; in practice, such is not the case'. Grierson's statement that the function is 'determined partly by custom' might be a forerunner of the approach of construction grammar, taking the view that a word does not acquire its full meaning until it is in a syntactic construction.

On the surface level, Tai- phake adjectives seems indistinguishable from verbs, and they are categorised as verbs or verbals by both Noss (1964) and Vichin Panupong (1970). However, later studies recognise adjectives as a separate class because *they can be both intransitive predicates (which nouns cannot) and can modify nouns (which verbs cannot).* In other words,

in Tai- phake language, adjectives can be both modifiers within a noun phrase and the heads of intransitive predications.

2.2 Position of adjectives

Adjectives can occur within the noun phrase as modifiers of their head nouns and function in the 'attributive' position. For example:

toŋ nā kāŋ
area rice field wide
'a wide paddy-field' (Phake sentence, Banchob 1987:9)
kāŋ is one of the semantical functions of an adjective, that of an attribute of a noun.

In Tai- phake, adjectives can occur in the post-verbal or 'predicative' position also. For example:

Leng Naiŋ ne Kiaŋ
car red BE fast
The red car is fast

2.3 Semantic prototypes of Tai Phake Adjectives:

Tai phake adjectives can be divided into the following semantic prototypes:

	Semantic Types	*Examples in English*	*Examples in Tai-Phake*
1	Dimension	big, short, thin, wide, long, small	Yāu, lɔt, yɔm, Kāŋ, Yāu, ɔn
2	Physical property	hard, strong, clean, sick, beautiful	Kheŋ, henŋ, sonŋ, khai, sƐn/cɔp
3	Speed	fast, slow, sudden	Kiaŋ, nān, momā kiaŋ
4	Age	New, young, old	maű, po maű/ po saű, yaű

5	Colour	Red, yellow, black, White	Naiŋ, lɔŋ, nam, khāu
6	Value	Good, bad	nī, minī
7	Difficulty	Easy, difficult	ŋai, Yāp,
8	Qualification	possible, normal	Jangpain, announg
9	Human propensity	Angry, happy, clever	cɔi nyut, cűm, phāi
10	Similarity	Like, unlike, similar, different	Thukjao, mauthukjao, tu koun, mau tukoun
11	Taste	Sweet, sour, bitter, hot	Űan, sɔum, khum, nyut, kāt
12	Quantifiers	Two, twice, same	Nu soŋ, soŋ pɔk, kyun phau

2.4 Modification of adjectives

Adjectives can be followed by a modifier which intensifies the meaning. Phake adjectives also can be pre-modified. Specific modifiers are very often either fully or partially reduplicated intensifier. The full list of the adjectival modifiers recorded by Banchob (1987) can be found in the English-Phake word finder. The semi-reduplicated nature of these specific modifiers makes it likely that they are an open class of words.

In present research also it was found that adjectives are reduplicated to intensify the statement of the speaker. For example,

Kiaŋ

quick

Kiaŋ Kiaŋ

very quick.

Another way of expressing intensification of adjectives is to repeat the adjective in combination with waa/wā as in the following Phake phrases:

kai wā kai

(far-SAY-far)

far, far away

hāi wā hāi

(bad-SAY -bad)

very very bad (as mentioned in Morey 2005)

2.5 Agreement

Indian languages show two types of gender, number or person agreement. In some languages adjectives agree with the noun they modify in gender, number or person and in some other they stay invariant. Tai – phake falls into second category of languages. In I,t there is no gender, number or person agreement. For example,

luksau nī

girl good

good girl

lukon nī

boy good

Good boy

lukasu khau nī

girl PRT good

good girls

lukon khau nī

boy PRT good

good boys

2.6 Degrees

In Tai phake adjectives can be used in both comparative and superlative form. However, unlike English here this change in degree can be done only periphrastically. For example,

Sita ne cɔp

Sita PRT beautiful

Sita is beautiful

Sita khen cɔp Gita

Sita COMP beautiful Gita

Sita is more beautiful than Gita

Sita kham tinŋ lounŋ khen cɔp

Sita SUP COMP beautiful

Sita is the most beautiful girl

3. Conclusion

Examining some of the nine factors mentioned in UNESCO's 2003 *Language vitality and endangerment* parameter for determining degree of endangerment of a language in the context of Tai-Phake, it is evident that Tai- phake comes under severely endangered group of language. However, it has a unique adjective morphology. Here, adjectives come after nouns in a sentence. This language has twelve class of adjective protypes. There is no gender, person, or number agreement with adjectives. Also, changes in degree of adjectives can be made only periphrastically.

During our study it was found that there is lack of research conducted on Tai- phake morphology. Only a few grammar and other related works are available with the community. As it is categorised in UNESCO's Endangered language group, it needs immediate action on the part of stakeholders for preservation and continuation of rich culture and heritage of this community.

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