DEVELOPMENT OF ARTICULATION DRILL BOOK FOR PERSONS WITH CLEFT PALATE IN MARATHI

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AUGUST, 2022

CERTIFICATE

This is to certify that this dissertation entitled "**DEVELOPMENT OF ARTICULATION DRILL BOOK FOR PERSONS WITH CLEFT PALATE IN MARATHI"** is a Bonafide work submitted in part fulfillment for degree of Master of Science (Speech-Language Pathology) of the student Registration number 20SLP034.This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for award of any other Diploma or Degree.

August, 2022
Mysuru

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DECLARATION

This is to certify that this dissertation entitled "**DEVELOPMENT OF ARTICULATION DRILL BOOK FOR PERSONS WITH CLEFT PALATE IN MARATHI**" is the result of my own study under the guidance of Dr. M. Pushpavathi. Director, All India Institute of Speech and Hearing, Mysuru and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

August, 2022 **Registration**
No.:20SLP034Mysuru

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CHAPTER I

INTRODUCTION

Craniofacial conditions are structural anomalies that occur at birth as a result of abnormal embryological development. Between the fourth and tenth week of development of the embryo or foetus, there is a halt in embryological growth that causes craniofacial differences (Peterson-Falzone, Hardin-Jones, & Karnell, 2001). The fourth most common birth defect and the most prevalent facial congenital defect is cleft lip and palate (CLP). A cleft is an abnormal opening or fissure in an anatomical structure that is normally closed. A cleft lip is the result of failure of parts of the lip to come together early in the life of a fetus.

CLP have multiple underlying causes. Geographical area, gender, population, dietary habit, use of drugs, smoking, drinking alcohol, low water contaminant sources, and birth weight have all been hypothesized as factors that contribute to the incidence rate of CL/P in newborns. Genetic and environmental risk factors have been identified as triggers for syndromic CL/P. However, the etiology of the more common non-syndromic CL/P remains largely unknown.

In a survey done in 2000 by the Tata Institute of Social Science in India, 1 million home visits were conducted, and the incidence rate of clefts was estimated to be one child per 781 births. It indicates that each year in India alone, 35,000 children are born with craniofacial defects. In the world, one in every 700 live births results in an oral cleft of some kind, such as a cleft lip, cleft lip and palate, or isolated cleft palate (World Health Organization [WHO], 2001).

CL/P occurs in between 0.30 and 2.65/1,000 live births worldwide. According to Jones et al., 2001, on an average, one live birth results in a cleft in every 500–750 births. Reddy et al., 2010, reported that there are 1.09 cleft lip and palate defects per 1000 live births in the Indian state of Andhra Pradesh. According to this study, 65 percent of the children were male born with clefts and according to the distribution of the different types of clefts, 33% had CL, 64% had CLP, 2% had CP, and 1% had the uncommon craniofacial cleft. Unilateral cleft lips were found in 79% of the patients. Of the unilateral cleft lip 64% were left sided. There was a significant correlation of children with cleft being born to parents who shared a consanguineous relationship and those who were illiterate with the odds ratio between 5.25 and 7.21 for consanguinity and between 1.55 and 5.85 for illiteracy.

The physical and psychological abilities of individual with CLP are affected in a number of ways, including nasolabial appearance, bone structure, swallowing, hearing, dental occlusion, delayed development, feeding issues in infancy as they age, and lifelong social and psychological issues as a result of the facial deformity. Individuals' quality of life, social development, and the nation's economy are all impacted. Infants with CLP experience feeding and nutrition issues because they are unable to suck on either their mother's nipple or from a bottle. As a result, the baby's weight and growth are affected because there isn't enough milk or food for growth. In addition to cosmetic problems, individual with CLP have difficulty producing labial sounds. Hearing loss and ear infections can occur due to the fluid build up in the middle ear caused by otitis media, Within the first six months of life, this condition manifests in a child with CLP. Dental issues include irregularities in tooth size and shape, such as the permanent lateral incisor's abnormal size and shape in the side of the cleft, irregularities in tooth position, and delays in the eruption of permanent teeth and the formation of permanent teeth. In addition to these issues, individual with CLP also struggle with their speech and language. Compared to language issues, speech issues are thought to be more prevalent in children with CLP.

Individual with a CLP have speech problems which result from velopharyngeal dysfunction. As a result, air enters the nose rather than the oral cavity because the soft palate cannot move upward to make contact with the nasal cavity. The term "hypernasality speech" refers to this issue. This case can be treated with a surgery to provide the velopharyngeal closure. The velopharyngeal deficiency in patients with CLP can be treated with pharyngeal flap and sphincter pharyngoplasty, which are regarded as safe procedures.

The majority of children with CLP will still have trouble developing their speech sounds even after the surgical repair (Hardin-Jones & Jones, 2005), thus affecting the speech intelligibility of an individual with CLP. Atypical resonance and misarticulated speech were two of the many factors listed by Whitehall and Chau (2004) which affects speech intelligibility in children with CLP. Children who were born with CLP are more likely to experience delays in early language development and speech development. Within the age range of 6 to 12 months, children with CLP exhibit variation in their sound production (Chapman, Hardin-Jones, Schulte, & Halter, 2001). Children with CLP have a limited range of phonological sounds in their repertoire, which includes vowels, glides, nasals, and glottal production of bilabial and velar sounds (Chapman et al., 2001). The most remarkable speech production problems demonstrated by the children with CLP are those related to velopharyngeal inadequacy including hyper nasality, audible nasal emission, weak pressure consonants and compensatory articulatory patterns.

CLP is the congenital disorder that affects the articulation structures most frequently. By changing the sizes and shapes of resonators, the outgoing breath stream and voice are modified through articulation. Speech sounds that are substituted, added, omitted, distorted, or in the wrong order are known as articulation errors. Such motarically-based errors are usually consistent. Since the sounds produced differ noticeably from normative productions, errors are referred to as "phonetic" in nature (Bauman-Waengler, 2000). When the movements of the articulators, such as the lips, tongue, palate, or resonating cavities, differ from normal articulations, phonetic disorders in cleft occur. Phonetic compensations include a glottal stop, velar, and pharyngeal production, as the kid tries to make the sound in a different way to compensate for the inability to build oral pressure due to poor velopharyngeal function. The glottal, pharyngeal, and velar productions have been characterized as phonetic and articulation, respectively, since they show an evident and productive compensation.

McDermott (1962), claims that the majority of CLP speakers exhibit /s/ distortions. They frequently misarticulate affricates and fricatives first, then plosives, glides, and finally nasals. Errors on the first three classes of sounds are thought to be primarily caused by velopharyngeal inadequacy. Children with CLP exhibit more articulatory errors than typical children, according to Philips and Harrison's (1969) research. They noted that the articulation scores of 94% of pre-schoolers with CLP who were 3 years old and older were found to be lower than those of comparable-aged healthy children.

Peterson-Falzone (1990) investigated 240 kids with repaired CLPs who were between the ages of 4years to 10 years and 11 months. The findings showed that articulation issues related to place or manner of production were present in more than 90% of the young school-aged children. According to Witzel (1991), approximately

25% of children with cleft lip and palate recover normal speech on their own after the palate has been repaired, but the remaining 75% require periods of speech therapy throughout childhood and adolescence to achieve acceptable speech production. According to Chapman et al. (2003), English-speaking toddlers with clefts produced oral stops, liquid labials, dentals, and velar sounds less accurately in their simple words. Children with CLP produced fewer oral stops than children without CLPs did at about one year of age, according to research by Chapman et al., 2009. Individual with CLP frequently display unusual articulation patterns. Glottal stops and pharyngeal fricatives are the most common compensatory articulations produced by these individuals. Others may develop compensation for palatal fistula or malocclusion (Petersen-Falzone 1989, Trost-Cardamone 1990).

1.1 NEED OF THE STUDY

It is necessary to correct the articulatory errors using various techniques because articulation disorder is most frequently seen in children with repaired and unrepaired cleft lip and palate due to their structural abnormalities and persistent VPD. Standard articulation therapy is used to treat malocclusion, velopharyngeal valving disorder, and other functional sequelae that result in misarticulation (Kummer, 2011). As a result, articulation approach is crucial for improving sound production in children with CLP and the use of articulation drill material is also crucial for establishing correct articulation placement and enhancing speech intelligibility. As there is no published articulation drill material, particularly for children with CLP, available in Marathi language, the clinician's task is made easier by using a single source of material that is articulation drill for both assessment and management.

Marathi language is mainly spoken in the state of Maharashtra. There are approximately sixty-two million speakers of Marathi, including speakers outside the native state of Maharashtra. Marathi occupies major geographically unique position as it is spoken in the area which link two major language families, that is Indo-Aryan in the north including languages like Gujrat and Hindi and Dravidian in the south including language like Kannada and Telugu. Marathi language consist of 14 vowels, 36 consonants. Marathi's primary word order is SOV (subject-object-verb). Its consonant cluster usage is extremely limited, and the word's first syllable typically receives the most stress. As children with CLP have trouble developing the intra oral breath pressure necessary for the production of these consonants, they are known to be most affected when producing pressure consonants. In the state of Maharashtra there are around 13 hospitals which provide free cleft lip and palate surgeries. Also after the surgery, rehabilitation in terms of speech therapy is essential for child's speech and language development. In the Marathi language, there is no articulation drill book. Hence, it is imperative to develop these material resources for speech language pathologists (SLP), to provide them as well as parents with the word list of each target sound in a systematic manner in different phonetic context. The articulation drill book will help to work with individual with CLP effectively. When only one source is used, speech therapy time will be used more efficiently because less time will be lost changing, arranging, and moving around various materials. SLP should have the resource material to understand the problem and what management options are suitable for the cleft lip and palate children. However, the resource material in the area of management for children with CLP who speak Marathi is limited. Hence it is necessary to develop the articulation drill book in Marathi. Articulation drill material comprises of syllables, word at different position, 2-3 word phrases, and grammatically complete sentences making it accessible for the SLP’s. Drill material produces effective results in a relatively short period of time. The present material developed can be used by teachers of the elementary grades to facilitate the growth of consonant mastery.

1.2 DESCRIPTION OF MARATHI LANGUAGE

One of India's eighteen official languages, Marathi Language belongs to the Indo-Aryan branch of the Indo-European language family and is spoken in the state of Maharashtra. With 30 districts spread throughout 7 sociolinguistic regions in the state of Maharashtra, which has a total area of 118,758 square miles, Maharashtra is home to six major dialects. There are around 62 million Marathi speakers worldwide, including those living outside of Maharashtra, the language's native state (Cardona & Jain, 2003). The Indo-Aryan family of the north and the Dravidian family in the south are linked through the Marathi language. The outer circle of Indo-Aryan languages includes this language (Grierson 1905) Marathi and other Indo-Aryan languages share a number of phonological characteristics. It has a sound design with a limited usage of consonant clusters and stress. Sanskrit is the foundation of Marathi's basic vocabulary, although over time, it has substantially incorporated words from many other languages. The words in Marathi have been influenced by words from nearby Dravidian languages.

Phonology of Marathi language:

There are 14 vowels in the Marathi language, all of which, with the exception of /ə/, can be either short or long. The meaning of a word is influenced by the length of a vowel. Along with 36 consonants, The pauses and affricates t—th, b—bh,p—ph, d—dh, k—kh, g—gh, and others are distinguishable between aspirated and unaspirated. Aspirated consonants are created by a strong airburst. Different apical and retroflex consonants include /t/ – /ʈ/, /d/ – /ɖ/, /n/ – /ɳ/, /r/ – /ɽ/ Contrary to retroflex consonants, which are generated when the tongue is curled such that the underside of the tongue reaches the roof of the mouth, apical consonants are produced when the tongue tip contacts the roof of the mouth.

Children with cleft lip and palate are at risk for certain speech and resonance disorder secondary to velopharyngeal insufficiency or incompetence, oral anomalies and dental malocclusions. Although speech proficiency improves with age, children with CLP may continue to exhibit speech problem consisting of articulation error into school age, adolescence and beyond (Sell, 2001). These deficiencies can present in adulthood also. Soon after an intervention of language problem, articulation disorder has to be intervened as it affects speech intelligibility. 2 Placement error is usually seen in children with CLP which consist mostly of pressure consonants. Use of articulation drill material is essential in order to establish correct the placement of articulation and to improve intelligibility of speech.

Among the various hospitals present in different states of India which provide surgeries for children with CLP, in the state of Maharashtra there are around 13 hospital of Smile train programme which provides free surgery and is located in Jalgaon (Astha plastic and cosmetic surgery centre),Aurangabad (Bembde hospital),Mumbai suburban(Shushrusha citizen cooperative hospital),Mumbai Thane (Meera Nx hospital),Mumbai(SRCC hospital), Latur(Lahane hospital), Pune(Poona hospital), Akola(Shriram hospital), Nashik (Vedant hospital LLP), Kolhapur(Western India institute of neurosciences),Wardha (Acharya vinoba bhave rural hospital), Wardha (Sharad pawar dental college & hospital), Solapur (Shri marakandey solapur sahakari rugnalaya and research centre niyamit).

As without standard, readily available material it is difficult to document the effect of surgery in the improvement of articulation in children with CLP. Also, the resource material is limited in the area of management for children with CLP in Marathi language. In this view, it is imperative to develop articulation material for children with CLP. Hence, the present study was aimed at developing articulation drill book for children with CLP in Marathi language.

1.3 Aim of the study:

To develop an articulation drill book for persons with CLP in Marathi language.

1.4 Objectives:

(a) To identify the pressure consonants in Marathi language.

(b) To compile the wordlist and picture material (meaningful words) loaded with pressure consonants in initial, medial, and final position in Marathi language.

(c) To compile paired words loaded with pressure consonants in Marathi language.

(d) To develop sentences loaded with pressure consonants in Marathi language.

(e) To obtain feedback of the developed stimuli by native speaker of Marathi SLP's.

CHAPTER II

REVIEW OF LITERATURE

Cleft of the lip and / or palate (CLP / P) is a congenital deformation that occurs in-utero during the first trimester of pregnancy. This is caused by a confluence of environmental and genetic variables. A cleft can occur in isolation or as a major / minor malformation which may be associated with a syndrome. The impact of the palatal cleft may be evident during the early vocalization of babies before surgical management. This may persist long after an adequate oral pharyngeal mechanism has been established.

Cleft lip and palate can be associated with feeding difficulties, dental anomalies, frequent otitis media, intellectual impairment, facial deformity, and communication disorders. Communication disorders can vary from hearing loss, delay in speech and language development, resonance disorder such as nasal air emission, nasal grimace and hypernasality, and presence of compensatory articulation leading to unintelligible speech.

2.1 Speech disorder in individual with cleft lip and palate

Cleft of the lip are repaired early in the infancy, and create speech problems only if subsequent tissue contraction makes it difficult for the lips to approximate to one another along their entire length. Individuals with CLP report to have misarticulation in which both place and manner of articulation are affected. They are reported to misarticulate voiced sounds more than their voiceless cognates. The consonant /m/, /n/, /j/ are most correctly articulated at least 80% of the time. Contrary to this, Spriesterbach (1956) and Mcwilliams (1958) reported difficulty with nasals and fricatives in children with cleft lip and palate. Mcwilliams et al., (1990) reported the individuals with CLP frequently substitute glottal stops for nasal fricatives and plosives, further their speech sound articulation is generally reported to be inappropriate. Atypical consonant production, altered laryngeal voice quality, aberrant nasal resonance, abnormal nasal airflow, and nasal or facial grimacing are all indicators of speech in individual with CLP (Roopa et al., 2009).

Various studies have been conducted to understand the articulatory production in children withs repaired CLP (Fletcher, 1978; Philips & Harrison 1969; Riski, 1979). Some young children with CLP are reported to have normal articulation (Dalston, 1990). However, as a group, their individual score was below the available norms on the articulation tests or lower than age-matched controls (Mcwilliams and Musgrave 1977; Morris 1962; Philips & Harrison, 1969; Van demark, Morris & Vandehaar 1979).

Bzoch (1965) studied the articulation proficiency and error patterns of preschool CLP and normal children in the age range of 3 to 7 years. 60 children with cleft of the secondary palate were compared to 120 typically developing preschooler without CLP. A set of picture card were used to elicit single word responses from each child. A total of 82 sound elements were tested in the initial, medial and final position. The results indicated that the children with CLP produced only 50% of the test sounds correctly, whereas the mean average for the control group was 79%. It was also found that 5-year-old children with CLP presented with decreased errors of articulation than 3-year-old normal children. The result also indicated that children with CLP exhibited substitution and distorted errors more than twice as frequently. Additionally, the omitted sounds were almost four times as frequently when compared to the control group. The high occurrence of omission errors in the children with CLP emphasized the extent of deficiency of articulation skills in this population. Moll (1968) reported the consonants involving lingual contacts to be more defective than those including the lips only across all manner of productions.

Fletcher (1978) analysed the articulation data from 70 subjects with CLP and identified a sibilant-non sibilant contrast. The investigator sorted the sounds, studied into three categories – (1) sibilants: /s/, /z/, /f/, /tʃ/, and /ʤ /, (2) non-sibilant fricatives: /θ/, /v/, /f/, and (3) plosives: /p/, /b/, /t/, /d/, /k/, /g/. According to the author, this classification resulted in more homogenous groupings of speech sounds than the more traditional assignment of speech sounds to fricative and affricate categories. The study reported mean error percentage of 47 for sibilants, 24 for non-sibilant, and 17 for plosives. The findings were consistent with those of Mcwilliams (1958) and Spriestresbach et al., (1956). Wherein, the subjects misarticulated over 40% of /s/ speech sounds studied in initial, medial, and final position of words. This latter finding was consistent with previous reports that have identified /s/ as the speech sound most frequently and consistently misarticulated by children with CLP (Byrne et al., 1961). Thus, from the above study it can be concluded that fricative sounds are affected in children with CLP.

Van Denmark et al., (1979) conducted a longitudinal study to investigate patterns of articulation abilities in 351 subjects with CLP from birth to 18 years. Up to the age of five, all the subjects underwent examinations every six months, and then once a year after that. IOWA Pressure Articulation Test and Templin Darley Screening Test of Articulation were studied and administered for the same, which consisted of a total of 105 items which comprised of 149 consonants and vowel sounds. The data was collected over a 15 years period and presented to be heterogeneous. The results indicated that the children with CLP improved in their articulation skill until age of 10 years and this trend continued after age 10 also, but, at a more gradual rate. The authors also reported that 80% of the test items were correctly produced by the children with cleft at 16 years of age.

The above studies strongly suggest presence of articulatory deficits in children with CLP across different age ranges. It was also observed that the traditional method of SODA error analysis was the widely used form of assessment. Later in mid-1980's, the studies were formed on describing articulation errors in terms of compensatory articulation (Trost & Cordermon, 1981). The compensatory articulation is reported to be seen for pressure consonants such as stops, fricatives, and affricates.

2.2 Compensatory Articulation in individual with cleft lip and palate

Compensatory articulation (CA) is a distinctive category in errors of place of articulation commonly observed in individuals with cleft lip and palate. This term describes specific errors of place of articulation that may occur in individual who have inadequate closure of the velopharyngeal valve or a cleft or fistula in the hard palate. Morley (1967) and Bzoch (1979) described compensatory articulation as "compensatory adjustments" and "laryngeal and pharyngeal gross substitution errors." Several studies have reported that, in most instances where compensatory articulation are substituted for target phonemes, the correct manner of articulation is preserved, while correct place of articulation is sacrificed (Counihan 1956, 1960; Spriestersbach et al., 1961). Compensatory articulation is classified into several types based on their position in the vocal tract where the sound is produced. There are different classification systems of compensatory articulation. The earliest classification of compensatory articulation was by Trost (1981). Recent classification of system includes those by John et al., (2006) and Henningson et al., (2008). Henningson et al., (2008) classified the consonant production errors as abnormal backing of oral target to postuvular place, abnormal backing or oral target with place as oral, nasal fricative, nasal consonant for oral pressure consonant, nasalized voiced pressure consonants, and weak oral pressures.

Compensatory articulation is reported to be acquired at the age of 6 months (Bzoch, 1997). Several studies have been conducted to investigate the compensatory articulation in children with CLP. A study by Chapman (1991) reported that infants with CLP produce half the number of consonants compared to that of infant without CLP. Thus, having an impact on the composition of early phonetic inventories which includes high pressure consonants. Apart from this, studies were also done to investigate the articulatory errors in pre-schoolers. A study by Jones et al., (2005) documented the presence compensatory articulation error in 25% of pre-schooler with mean age of 42 months with repaired CLP. A similar study by Mary et al., (2005) reported that pre-schooler with CLP presented with glottal / pharyngeal articulation during the significant production. Glottal stop, glottal fricative, mid dorsum palatal stop and nasal substitution were also reported.

Studies focusing on school going children indicated increased errors on nasal production and pressure consonants with maximum errors on fricative and affricate compared to plosives (Vandermark et al., 1979). Paliiobei et al., (2005) evaluated the articulation abilities of individuals with CLP between the ages of 5-15 years. The results indicated compensatory articulations in the participants who had received a delay in hard palate closure. A study by Albustanji et al., (2014) reported compensatory articulation in 71 % of children with mean age of 6.7 months, despite of early palatal closure. Further, the authors also reported the pharyngeal fricative and glottal stop to be the frequently observed error.

Jones et al., (2018) conducted a study to investigate the nasal substitution in early words of toddler in CLP. Thirty-four toddlers with non-syndromic CLP and 20 non cleft toddlers, followed from age 13 to 39 months. An assessment was carried in 9, 13, 17, 21, 27, 33, and 39 months of age. The results indicated that 67% of toddler in cleft group and 35% of toddler in non-cleft groups produced nasal substitutions in their early words. Parisa Rezaei et al., (2020) reported a higher rate of compensatory misarticulation (71.1%) in school going children of age 3-7 years. Thus, from the above studies it can be concluded that children with cleft lip and palate demonstrate compensatory articulation leading to unintelligible speech.

Most of the studies have reported the common types of compensatory articulation errors seen in children with CLP are glottal stop substitution for /k/ and /g/, pharyngeal stop substitution for sibilant fricatives /s/ /z/ /ʃ/ /ʒ/ or for oral affricates /tʃ/ /ʤ/,pharyngeal fricative substituted for oral affricates /tʃ/ /ʤ/, pharyngeal affricate substituted for sibilant fricatives and affricates ,posterior nasal fricative substituted for sibilant fricatives or any of the stop consonants ,laryngeal fricative , velar fricatives, mid- dorsum palatal stop (sounds like a mix between /t-k/ or /d-g/) substituted for /t/ or /k/ and /d/ or /g/,mid dorsum palatal fricative substituted for velar fricative (Trost,1981; Kawano et al., 1985).

Similar studies have been done In Indian context in children with CLP, indicating the presence of compensatory articulation which is predominantly glottal stop followed by weak oral pressure consonants and velar stop by Gopi sankar (2012), Savitha et al., (2018), Deepthi et al., (2020), Aparna et al., (2020) and Manjunath et al., (2022).

2.3 Intervention of Articulation Disorder in individual with CLP

Research has indicated the presence of compensatory articulation, even after the surgical management, leading to reduced speech intelligibility (Moris & Vandehaar, 1979). Thus, inviting the attention for speech therapy in individual with RCLP. Articulation therapy is provided mainly through auditory, visual and tactile cues. These cues help to achieve the articulation better and faster. In majority of children, proper articulatory positioning will be the therapy's initial objective. The American speech and hearing association (ASHA), categorizes compensatory articulations are categorized as “Treatable errors”. They emphasize the objective of articulation therapy to correct the oral place of articulation and to establish the oral pathway of airflow.

Articulation therapy may turn to the mastery of phonemic patterns when the child learns the proper phonetic patterns (Trost-Cardamone & Bernthal, 1993). The principles of therapy are essentially the same for children with CLP as they are with any other child, but the impact of cleft is always considered. Research also suggested that establishing stops and fricatives in a few sounds may help to generalize those qualities in other sounds. Several studies have been conducted focusing on the intervention of cleft lip and palate and are discussed below.

Several therapy techniques have been discussed in the literature addressing intervention of individual with cleft lip and palate. Paul, (2001) proposed child-centred approach, hybrid approaches (milieu teaching, script therapy) and clinician-directed approaches (drill, drill play modelling) approaches to increase early vocabulary in children with cleft lip and palate. Shriberg and Kwiatkowski, (1982) found drill and play form of activities to be superior compared to structured play or play in terms of effectiveness and efficiency. Thus, articulation drill material is essential and the most efficient procedure to accomplish articulation therapy, especially when targeting speech sounds at the syllable and word level. Drill is very effective when combined with stimulating stimuli and reinforcement materials, a positive clinical attitude, and a quick speed.

Articulation and phonological treatment protocols specify various kinds of stimuli to evoke the target phoneme productions. Finding appropriate words and pictures to evoke target phoneme productions can be an extremely time consuming task for a busy clinician. An articulation drill book will lighten the task of speech pathologist who frequently needs to spend considerable time developing word lists and organizing speech materials from many diverse sources. Since the drill materials are divided by parts of speech, the speaker will be able to move immediately from isolated word level to the grammatical use of speech in 2-3 word phrases and structurally complete sentences.

Drill materials produce effective results over relatively short period of time. Articulation drill book also contains materials for the purpose of developing listening skills and auditory discrimination, both vital and necessary before the child is able to read or write with any degree of proficiency. They are organized to provide practice drill for persons with articulation difficulty of either functional or organic origin. A single source book containing suitable speech drills can easily be taken from school to school. Time devoted to speech therapy will be more effectively utilized when a single source is used. Time will not be lost in changing, arranging and shifting about of different materials if a single source is used while the speech clinician in hospitals, clinics, and private practice is not necessarily faced with the task of transporting different materials, he or she needs to spend countless hours organizing appropriate speech materials from different sources. A single source book can lighten the task of this group as well. The drill material could also be used by the teacher of the early elementary grades to facilitate the growth of consonant mastery. The teacher can use these word lists to develop a reading vocabulary and teach word attack.

There are so many attempts to provide stimulus material in different languages to provide articulation therapy. Since articulation disorder is seen more in children with cleft lip and palate, articulation drill material is essential for improving articulation. Some of the books which made attempt to provide stimuli materials for articulation correction are given in table 2.1.

Table 2.1:

List of stimulus books for articulation correction available

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Sl no.	Title of the book	Authors	Year of publication
1	Sound Stimuli for /p/ /b/ /f/ /v/ /s/ /z/, Book for Treatment Protocols for Articulation and Phonological Disorders.	M. Hegde, Ph.D., Adriana Peña-Brooks, M.A.	2006
2	Sound Stimuli for /t/ /d/ /ʧ/ /ʤ/ /Σ/ /Ʒ/, Book 2 for Treatment Protocols for Articulation and Phonological Disorders	Hegde, M., Peña-Brooks, M.A.	2007
3	Sound Stimuli for /k/ /g/ /m/ /n/ /ng/ /l/, Book 3 for Treatment Protocols for Articulation and Phonological Disorders	Hegde, M., Peña-Brooks, M.A.	2007
4	Sound Stimuli for /θ/ /ð/ /r/ /ɚ/ /ɝ/ /w/ /h/ /j/, Book 4 for Treatment Protocols for Articulation and Phonological Disorders	Hegde, M., Peña-Brooks, M.A.	2007

In Indian context, articulation drill book for individual with CLP was developed as a part of dissertation in few languages given in table 2.2. below.

Table 2.2

List of articulation drill book available in Indian context.

Sl no.	Title of the book	Authors	Year of publication
1.	Development of articulation drill book for Cleft Palate population in Telugu.	Hemalatha	2011
2.	Development of Articulation Drill Book for Cleft Palate Population in Kannada.	Prasad	2011
3.	Development of articulation drill book for cleft palate population in Malyalam.	Weshley	2011
4.	Development of articulation drill book for cleft palate population in Hindi	Barkha	2012

The above table lists the various articulatory drill material available in different Indian languages. Articulation drill material is available in Telugu, Kannada, Malayalam, and Hindi languages and is essential to be developed in the other Indian languages as well. In the state of Maharashtra, Marathi is a widely spoken, there are many centers which provide free surgeries for children with cleft lip and palate. From the previous studies we can infer that articulation drill material is necessary to asses as well as manage individuals with cleft lip and palate to make CLP speech intelligible. As there is no published articulation drill material especially for individuals with cleft lip and palate in Marathi language the present study was planned.

CHAPTER III

METHOD

The present study was aimed at developing an articulation drill book in Marathi language for persons with cleft palate. The objective of the present study is as follows:

(a) To identify the pressure consonants in Marathi language.

(b) To compile the wordlist and picture material (meaningful words) loaded with pressure consonants in initial, medial, and final position in Marathi language.

(c) To compile paired words loaded with pressure consonants in Marathi language

(d) To develop sentences loaded with pressure consonants in Marathi language.

(e) To obtain feedback of the developed stimuli by native speaker of Marathi SLP's.

The development of the articulation drill material was carried out in three phases. The phases included:

Phase 1: Identification of pressure consonants in Marathi language.

Phase 2: Compilation of words and pictures for articulation drill material. This phase was further carried out under 4 stages.

Stage I - Compilation of words (picturable and non picturable) with pressure consonants in three different positions (Initial, medial and final).

Stage II – Compilation of paired words with pressure consonants.

Stage III – Development of sentences loaded with pressure consonants.

Stage IV – Selection of pictures for words in three positions.

Phase 3: Content validation of articulation drill book.

3.1. Phase 1: Identification of pressure consonants in Marathi language.

Individuals with repaired / unrepaired cleft lip and palate have difficulty in producing pressure consonants (Jones et al, 2003). Thus, the present study aimed at developing an articulation drill book loaded with pressure consonants in Marathi language. Initially, the pressure consonants of Marathi language were identified. For this purpose, an extensive review was carried on the available material describing the phonology of Marathi language. The following books were reviewed for the same and is mentioned in table 3.1.

Table 3.1

Referred books on the phonology of Marathi language.

Sl no.	Title of the book	Authors	Year of publication
1.	The Phonology and Morphology of Marathi	Kelkar Ashok Ramchandra	1958
2.	The Indo aryan languages	Colin Masica	1993
3.	Pronunciation Problem of Marathi Speaker	Ghatage C	2013
4.	Phonotactic frequency in Marathi	Berkson, Kelly and Nelson	2017

The description provided by Berkson et al (2017) of phonology in Marathi language is considered for the present study. The phonemes considered are given in the table 3.2 below.

Table 3.2

The description of phonology in Marathi language provided by Berkson et al (2017).

	Bilabial	**Dental**	**Alveolar**	**Retroflex**	**Palatal**	**Velar**	**Glottal**
Stops	p b pʰ bʰ	t̪ d̪ t̪ʰ d̪ʰ		t d tʰ dʰ		k g kʰ gʰ	
Affricates			ts		tʃ dʒ tʃʰ dʒʰ		
Fricatives			s		ʃ		h

Thus, the present study consisted of articulation drill material with 16 stop consonants, 5 affricates and 2 fricatives and 1 glottal.

3.2 Phase 2: Compilation of words and picture for articulation drill material.

Phase 2 was further carried out in 4 stages which are described below:

3.2(a). Stage I- Compilation of words loaded with pressure consonants in three different positions (Initial, medial and final).

The first stage of phase 2 included identifying words loaded with pressure consonants. Hence, extensive research was carried out to find words loaded with pressure consonants. These words were selected from different resources which included Marathi balbharti school textbooks (grade iii to ix), children's story books, newspaper, internet, and dictionary. Following this, an attempt was made and the word list was classified into (a) picturable words, and (b) non picturable words. Furthermore, the words were classified based on the simplicity, complexity and picturability.

The picturable words were identified as those words which were represented by visual image, easy for the child to understand, present in the vocabulary of the children above 3 years of age and occurring frequently in their environment. Additionally, care was taken to select colorful pictures for the articulation drill material. Example for picturable words are as follows: पाव (/pa:v/). Non picturable words were identified as those which could not be represented visually or through pictures.The words which are simple, frequently used in the day to day conversation were given preference. Example: पुढे (/puɖʰeː/), सपाट (/səpɑːʈ/), ताप (/t̪ɑːp/).

Finally, the word list was arranged in increasing order of complexity. The simple words were present in the beginning of the word list and the complex words in the end. The complex words included cluster productions and blends. Thus, the word list consisting of picturable and non-picturable words with pressure consonants in initial, medial and final consonants were prepared. Nasal consonant was excluded in the present study.

3.2 (b) Stage II - Compilation of paired words loaded with pressure consonants.

The second stage of phase 2, was compilation of paired words with pressure consonants. Paired words were considered as discrimination training is an important stage of articulation therapy for children with CLP. Few paired words considered in the present study are as follows: बस-खस (/bəs-kʰəs/), भूत – पूत (/bʰuːt̪ - puːt̪/), ताजी-भाजी (/t̪ɑːʒiː-bʰɑːdʒiː/).

3.2. (c) Stage III - Development of sentences loaded with pressure consonants

Stage III of phase 2, included development of sentences loaded with pressure consonants. Sentences were considered in the present study as they aid in generalization, which is also considered as one of the important stage in articulation therapy. The sentences were prepared using the words loaded with pressure consonants in different positions within the sentences. The sentences ranged from simple to complex. They were selected based on the frequency of occurrence of word, simplicity, meaningfulness, length of the word in the language. Nasal consonants were not considered in the formation of sentences. An example of the sentence loaded with pressure consonants is as follows: परुल परी आहे (/pərul pəriː ɑːɦeː/)

3.2 (d) Stage IV - Selection of pictures for words in three positions.

Stage IV of phase 2 included selection of pictures for word in initial, medial and final position. Picturable words were considered as stimulability is important, in terms of providing auditory, visual and tactile cues to enhance learning. For each word, three colorful and unambiguous pictures were selected keeping in consideration the middle socio – economic status and other cultural aspects of the population considered in the present study. Three appropriate pictures were selected for each target sound to represent the word. Further the validation of words and pictures is discussed in phase 3 of the study.

3.3 Phase 3: Content validation of articulation drill book.

Content validation for the word, paired word, sentences, and picture stimuli was carried out in this phase. The stimuli and words were given to three experienced speech language pathologist (SLP's) for content validation. The judges considered in the present study were native speakers of Marathi with a minimum of three years clinical experience in communication disorders. The judges were requested to rate the non-picturable word list on the following parameters:

For picturable words the SLP's were requested to judge and select one picture out of 3 [picture (a), (b) and (c)] based on the iconicity. For paired word and sentences, judges were requested to rate based on the parameters: (a) meaningfulness, and (b) familiarity using a 3 point rating scale were 0 indicated no meaningful/not familiar, 1-fairly meaningful/familiar and 2-meaningful/familiar.

For picturable words the SLP's were requested to judge and select one picture out of 3 [picture (a), (b) and (c)] based on the iconicity. For paired word and sentences, judges were requested to rate based on the parameters: (a) meaningfulness, and (b) familiarity using a 3 point rating scale were 0 indicated no meaningful/not familiar, 1-fairly meaningful/familiar and 2-meaningful/familiar.

The judges were made aware that the stimuli will be used mainly for children with cleft lip and palate. They were also informed that the present study considered only pressure consonants and excluded nasal consonants. The valuable feedback rating was considered for the compilation on the articulation drill book.

Overall, the judges were requested to rate the material. For this, scale of "Feedback questionnaire for aphasia treatment manual" (Goswami et al, 2010) was used. Various parameters relevant to the present study were selected from the above-mentioned scale and are as follows: (a) simplicity, (b) proverbility, (c) accessible, (d) complexity, (e) trainability, (f) stimulability, (g) size of the picture, (h) color and appearance, (i) feasibility, and (j) scoring pattern.

Based on this, the feedback was obtained and analysis was carried out. In instances where two judges had an agreement of rating of the words, paired words, sentences, and picturable words as ‘2’ and ‘1’, they were considered in the final list. Instances where two judges were not in agreement or rated the stimuli as ‘0’ was excluded from the list.

CHAPTER IV

RESULTS AND DISCUSSION

The present study was aimed at developing an articulation drill book in Marathi language for persons with CLP. The objective of the present study are as follows:

(a) To identify the pressure consonants in Marathi language.

(b) To compile the wordlist and picture stimuli (meaningful words) loaded with pressure consonants in initial, medial, and final position in Marathi language.

(c) To compile paired words loaded with pressure consonants in Marathi language.

(d) To develop sentences loaded with pressure consonants in Marathi language.

(e) To obtain feedback of the developed stimuli by native speaker of Marathi SLP's.

The present study was carried out in 3 phases. Objective (a), (b), (c), and (d), are addressed by phase I and II, and objective (e) is addressed by phase III.

4.1. (a) Identification of pressure consonants in Marathi language.

The first objectives of the study was to identify the pressure consonants in Marathi language. For this purpose, an extensive review was carried out on the available description of the phonology in Marathi language. The phonology description provided by Berkson et al., (2017) in Marathi language was considered for the present study. Thus, the present study consisted of developing articulation drill material with 16 stop consonants, 5 affricates and 2 fricatives in initial, medial, and final position.

Further, in the following sections the details of the word list and picture list are discussed below.

4 .1. (b) Compilation of words and picture stimuli loaded with pressure consonants in three different position (initial, medial, and final).

The second objective of the study was to develop picturable word list and non picturable word list using pressure consonant in three different word positions in Marathi. The words (picturable and non-picturable) were identified by carrying out extensive research of different resources available. The words shortlisted, were selected from the different resources. Further, the list was classified as (i) non picturable word list, and (b) picturable word list.

(i) The selected non-picturable words were provided to 3 speech language pathologist (SLP) for content validation. 3 SLP's were requested to judge and select the words based on non-picturablility, meaningfulness, and familiarity.

A total of 670 words were selected to develop the word list from the above mentioned resources, out of which 661 was considered in to the final list. The remaining words were excluded from the word list, as the judges rated them '0' due to their picturability and less familiarity. The details of the words considered across three different positions is given in table 4.1.

Table 4.1

Details of total number of non-picturable words across the different place and manner of articulation for the articulation drill book in Marathi

	P	Bilabial			Dental			Alveolar			Retroflex			Palatal			Velar			Total		
		I	M	F	I	M	F	I	M	F	I	M	F	I	M	F	I	M	F	I	M	F
Mn	S	68	58	25	66	63	39	-	-	-	15	34	23	-	-	-	47	52	25	196	207	112
	A	-	-	-	-	-	-	5	5	6	-	-	-	35	25	8	-	-	-	40	30	14
	F	-	-	-	-	-	-	13	14	9	-	-	-	14	8	4	-	-	-	27	22	13
	T	68	58	25	66	63	39	18	19	15	15	34	23	49	33	12	47	52	25	**661**		

Note : P-Place, Mn – Manner, I – initial position, M – medial position, F- final position, S – Stops, A – Affricate, F – Fricative, T – Total

A total number of 661 words were selected, out of which 515 were stops, 84 were affricates, 62 were fricatives. Further, the category under stops included,

(a) Among bilabials, 68 words were in initial position; 58 in medial position, and 25 in final position. The details of the words considered based on the phoneme for bialbals is given in table 4.2 below

Table 4.2

Total number of non picturable words selected for target phoneme for bilabials

Bialbials	Words (non-picturable)		
	I	M	F
/p/	15	21	15
/b/	20	17	5
/pʰ/	13	10	2
/bʰ/	20	10	3

(b)Among dental, 66 words were in initial position, 63 in medial position, and 39 in final position.

The details of the words considered based on the phoneme for dentals is given in table 4.3 below.

Table 4.3

Total number of non picturable words selected for target phoneme for dentals.

Dental	Words (non-picturable)		
	I	M	F
/t̪/	20	25	26
/t̪ʰ/	13	6	2
/d̪/	19	24	6
/d̪ʰ/	14	8	5

(c) Among retroflex, 15 words were in initial position, 34 in medial position, and 23 in final position.The details of the words considered based on the phoneme for retroflex is given in table 4.4 below.

Table 4.4

Total number of non picturable words selected for target phoneme for retroflex.

Retroflex	Words (non-picturable)		
	I	M	F
/t/	11	8	14
/tʰ/	4	3	-
/d/	-	17	7
/dʰ/	-	6	2

(d) Among velars, 47 words were in initial position, 52 in medial position, and 25 in final position.The details of the words considered based on the phoneme for velar is given in table 4.5 below.

Table 4.5

Total number of non picturable words selected for target phoneme for velar.

Velar	Words (non-picturable)		
	I	M	F
/k/	19	32	10
/kʰ/	11	7	4
/g/	10	9	10
/gʰ/	7	4	1

Further, the category under affricates:

(a) Among alveolar, 5 words were in initial position; 5 in medial position, and 6 in final position. The details of the words considered based on the phoneme for alveolar is given in table 4.6 below.

Table 4.6

Total number of non picturable words selected for target phoneme for alveolar.

Alveolar	Words (non-picturable)		
	I	M	F
/ts/	5	5	6

(b) Palatal, 35 words in initial position, 25 in medial position, and 8 in final position. The details of the words considered based on the phoneme for palatal is given in table 4.7 below.

Table 4.7

Total number of non picturable words selected for target phoneme for palatal.

Palatal	Words (non-picturable)		
	I	M	F
/tʃ/	6	8	-
/tʃʰ/	3	1	2
/dʒ/	14	13	6
/dʒʰ/	12	3	-

Further, the category under fricatives:

(a) Among alveolar, 13 words were in initial position; 14 in medial position, and 9 in final position. The details of the words considered based on the phoneme for alveolar is given in table 4.8 below.

Table 4.8

Total number of non picturable words selected for target phoneme for alveolar

Alveolar	Words (non-picturable)		
	I	M	F
/s/	13	14	9

(b) Among palatal, 14 words were in initial position, 8 words in medial position, and 4 words in final position. The details of the words considered based on the phoneme for palatal is given in table 4.9 below.

Table 4.9

Total number of non picturable words selected for target phoneme for palatal

Palatal	Words (non-picturable)		
	I	M	F
/ʃ/	14	8	4

The detailed word list for non picturable word is given below in table 4.10.

Table 4.10

Non picturable word list

(i) Non Picturable Words /p/

	Initial		Medial		Final	
Sl.no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/puɖʰeː/	पुढे	/kəpəʈ/	कपट	/ləp/	लप
2	/piːʈʰ/	पीठ	/bɑːpəʈ/	बापट	/tʃuːp/	चूप
3	/piːs/	पीस	/səpɑːʈ/	सपाट	/kʰuːp/	खूप
4	/pɑːɦɑː/	पाहा	/kɑːpəɖ/	कापड	/ruːp/	रूप
5	/pɑːɖɑː /	पाडा	/vɑːpər/	वापर	/dʒʰeːpə/	झेप
6	/pəl/	पळा	/d̪upɑːr/	दुपार	/leːp/	लेप

7	/pəd̪ək/	पदक	/kɔpiː/	कॉपी	/t̪ɑːp/	ताप
8	/pəɖəl/	पडल	/gəppɑː/	गप्पा	/kɑːp/	काप
9	/pərət̪/	परत	/t̪ʰɑːppiː/	थाप्पी	/dʒa:p/	जाप
10	/pəɦɑːʈ/	पहाट	/kʰuːpəts/	खूपच	/dʒʰo:p/	झोप
11	/pəkəɖ/	पकड	/gupit̪/	गुपित	/ʈiːp/	टीप
12	/pəd̪viː/	पदवी	/d̪ʰəpɑːʈɑː/	धपाटा	/ʈɑːiːp/	टाईप
13	/pɑːtsəvɑː/	पाचवा	/tsuʈpuʈ/	चुटपुट	/niroːp/	निरोप
14	/pisɑːʈ/	पिसाट	/dʒəjpur/	जयपुर	/kuruːp/	कुरूप
15	/pərisər/	परिसर	/upəjoːg/	उपयोग	/svəruːp/	स्वरूप
16			/upətʃɑːr/	उपचार		
17			/dʒʰəʈpəʈ/	झटपट		
18			/d̪ʰɑːvpəʈuː/	धावपटू		
19			/ɑːpəʈəlɑː/	आपटला		
20			/əpəgʰɑːt̪/	अपघात		
21			/spərd̪ʰɑː/	स्पर्धा		

(ii) Non picturable words /b/

	Initial		Medial		Final	
Sl no.	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/bəgʰ/	बघ	/keːbəl/	केबल	/ədʒəb/	अजब
2	/beːt̪/	बेत	/leːbəl/	लेबल	/gɑːjəb/	गायब
3	/boːr/	बोर	/d̪ubəiː/	दुबई	/sɑːɦeːb/	साहेब
4	/bɑːiː/	बाई	/tʃərəbiː/	चरबी	/kʰərɑːb/	खराब
5	/bɑːlu/	बाळू	/əboːl/	अबोल	/gəriːb/	गरीब
6	/bətʃət̪/	बचत	/bəbəliː/	बबली		
7	/bəd̪əl/	बदल	/ruːbəl/	रूबल		
8	/bɑːlək/	बालक	/bɑːbəriː/	बाबरी		
9	/bətʃɑːv/	बचाव	/gəɖbəɖ/	गडबड		
10	/bəd̪ʰiːr/	बधीर	/bulbul/	बुलबुल		
11	/bɑːɦeːr/	बाहेर	/ʃəbd̪/	शब्द		
12	/beːkɑːr/	बेकार	/kəbdʒɑː/	कब्जा		
13	/bɑːriːk/	बारीक	/pʰəlbɑːg/	फळबाग		
14	/bəkʃiːs/	बक्षीस	/gʰɑːbərəlɑː/	घाबरला		
15	/bɑːgəɖət̪e/	बागडते	/dʒəbɑːbəd̪ɑːr/	जबाबदार		
16	/bəroːbər/	बरोबर	/bəɖbəɖəgiːt̪/	बडबडगीत		

17	/bud̪ʰəvɑːr/	बुधवार	/beːdʒbɑːbəd̪ɑːr/	बेजबाबदार
18	/bəɦɑːd̪uːr/	बहादूर		
19	/bɑːləviːr/	बालवीर		
20	/brɑːdʒʰiːl/	ब्राझील		

(iii) Non Picturable /pʰ/

	Initial		Medial		Final	
Sl no.	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/pʰɑːr/	फार	/t̪oːpʰɑː/	तोफा	/sɑːpʰ/	साफ
2	/pʰoːɖiː/	फोडी	/əpʰɑːʈ/	अफाट	/vɑːpʰ/	वाफ
3	/pʰukəʈ/	फुकट	/əpʰəvɑː/	अफवा		
4	/pʰaːilɑːv/	फैलाव	/ləpʰəɖɑː/	लफडा		
5	/pʰərəʃiː/	फरशी	/ləpʰəɖeː/	लफडे		
6	/pʰərək/	फरक	/opʰər/	ऑफर		
7	/pʰəks/	फॅक्स	/t̪ʰoːɖeːpʰɑːr/	थोडेफार		
8	/pʰeːkəliː/	फेकली	/t̪oːpʰəkʰɑːnɑː/	तोफखाना		
9	/pʰɑːjəd̪ɑː/	फायदा	/vispʰoːʈək/	विस्फोटक		
10	/pʰɑːrəʃɑː/	फारशा	/lɑːkuːɖəpʰɑːʈɑː/	लाकूडफाटा		

11	/pʰəkiːr/	फकीर	
12	/pʰəlbɑːg/	फळबाग	
13	/pʰeːbruvɑːriː/	फेब्रुवारी	

(iv) Non Picturable /bʰ/

	Initial		Medial		Final	
Sl no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/bʰeːʈ/	भेट	/ubʰiː/	उभी	/lɑːbʰ/	लाभ
2	/bʰuːt̪/	भूत	/ʃoːbʰɑː/	शोभा	/ʃubʰ/	शुभ
3	/bʰɑːv/	भाव	/ubʰɑː/	उभा	/suləbʰ/	सुलभ
4	/bʰɑːg/	भाग	/ɑːbʰɑːs/	आभास		
5	/bʰɑːdʒ/	भाज	/vibʰɑːg/	विभाग		
6	/bʰər/	भर	/prəbʰɑːt̪/	प्रभात		
7	/bʰɑːriː/	भारी	/svəbʰɑːv/	स्वभाव		
8	/bʰɑːuː/	भाऊ	/əsəbʰj/	असभ्य		
9	/bʰiːkʰ/	भीख	/svəbʰɑːv/	सौभाग्य		
10	/bʰɑːʃɑː/	भाषा	/əbʰjɑːs/	अभ्यास		
11	/bʰəʈʈiː/	भट्टी				
12	/bʰəvj/	भव्य				

13	/bʰɑːgj/	भाग्य
14	/bʰəʈək/	भटक
15	/bʰuːgoːl/	भूगोल
16	/bʰoːvərɑː/	भोवरा
17	/bʰərəpur/	भरपुर
18	/bʰiɖəlɑː/	भिडला
19	/bʰəviʃj/	भविष्य
20	/bʰɑːrət̪iːj/	भारतीय

(v) Non Picturable Word /t̪/

	Initial		Medial		Final	
Sl no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/t̪eːl/	तेल	/sət̪i/	सति	/beːt̪/	बेत
2	/t̪əɖʰeː/	तढे	/gət̪iː/	गती	/gʰeːt̪/	घेत
3	/t̪ɑːiː/	ताई	/sət̪ət̪/	सतत	/jeːt̪/	येत
4	/t̪ɑːp/	ताप	/sət̪əv/	सतव	/reːt̪/	रेत
5	/t̪ɑːk/	ताक	/tʃət̪ur/	चतुर	/bʰɑːt̪/	भात
6	/t̪ɑːr/	तर	/ut̪ər/	उतर	/kʰət̪/	खत

7	/t̪ɑːl/	ताल	/vəst̪uː/	वस्तू	/ɑːt̪/	आत
8	/t̪ɑːs/	तास	/kəʈut̪ɑː/	कटुता	/dʒɑːt̪/	जात
9	/t̪ir/	तिर	/ʃəkt̪iː	शक्ती	/riːt̪/	रीत
10	/t̪udʒʰɑː/	तुझा	/kəvit̪ɑː/	कविता	/aːikət̪/	ऐकत
11	/t̪oːpʰɑː/	तोफा	/vaːit̪ɑːg/	वैताग	/kəlt̪/	कळत
12	/t̪iːl/	तीळ	/ʃət̪ək/	शतक	/ɦəsət̪/	हसत
13	/t̪jɑːg/	त्याग	/kərt̪uːdʒ/	कर्तूज	/tsəɖʰət̪/	चढत
14	/t̪əjɑːr/	तयार	/d̪urust̪/	दुरुस्त	/pərət̪/	परत
15	/t̪əseːts/	तसेच	/ut̪səv/	उत्सव	/d̪ʰɑːvət̪/	धावत
16	/t̪ikʰəʈ/	तिखट	/ut̪sɑːɦə/	उत्साह	/d̪əlit̪/	दलित
17	/t̪ikəɖeː/	तिकडे	/bɑːgəɖət̪eː/	बागडते	/gupit̪/	गुपित
18	/t̪uləsiː/	तुलसी	/bʰɑːrət̪iːjə/	भारतीय	/d̪aːulət̪/	दौलत
19	/t̪ukəɖɑː/	तुकडा	/prət̪iːkʂɑː/	प्रतीक्षा	/ʃikət̪/	शिकत
20	/t̪ɑːlɑːsurɑːt̪/	तालासुरात	/əsət̪ɑːt̪/	असतात	/dʒɑːst̪/	जास्त
21			/sɑːɦit̪j/	साहित्य	/d̪urust̪/	दुरुस्त
22			/ət̪iʃəj/	अतिशय	/əlgət̪/	अलगत
23			/sət̪kɑːr/	सत्कार	/gudʒrɑːt̪	गुजरात
24			/prət̪ikuːl/	प्रतिकूल	/t̪ɑːlɑːsurɑːt̪/	तालासुरात
25			/svət̪hsɑːʈʰiː/	स्वतःसाठी	/dʒɑːɦirɑːt̪/	जाहिरात

26					/t̪ʰoːɖkjɑːt̪/	थोडक्यात

(vi) Non Picturable words /t̪ʰ/

	Initial		Medial		Final	
Sl no	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/t̪ʰeːʈ/	थेट	/jeːt̪ʰeː/	येथे	/t̪it̪ʰ/	तिथ
2	/t̪ʰər/	थर	/kət̪ʰɑː/	कथा	/d̪uːrəst̪ʰ/	दूरस्थ
3	/t̪ʰuk/	थुक	/prət̪ʰɑː/	प्रथा		
4	/t̪ʰɑːl/	थळ	/ərt̪ʰ/	अर्थ		
5	/t̪ʰɑːʈ/	थाट	/st̪ʰəl/	स्थळ		
6	/t̪ʰoːr/	थोर	/pəd̪ɑːrt̪ʰ/	पदार्थ		
7	/t̪ʰoːɖ/	थोड				
8	/t̪ʰoːɖeː/	थोडे				
9	/t̪ʰaːilɑː/	थैला				
10	/t̪ʰəkəvɑː/	थकवा				
11	/t̪ʰɑːppiː/	थाप्पी				
12	/t̪ʰoːɖeːpʰɑːr/	थोडेफार				
13	/t̪ʰoːɖəkjɑːt̪/	थोडक्यात				

(vii) Non picturable words /d̪/

	Initial		Medial		Final	
Sl no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/d̪uːr/	दूर	/vɑːd̪/	वाद	/kʰeːd̪/	खेद
2	/d̪eːʃ/	देश	/səd̪ɑː/	सदा	/ɦaːud/	हौद
3	/d̪əjɑː/	दया	/dʒɑːd̪u/	जादु	/əgəd̪iː/	अगदी
4	/d̪əgɑː/	दगा	/d̪ɑːd̪ɑː/	दादा	/ʃəbd̪/	शब्द
5	/d̪aːuɖ/	दौड	/jɑːd̪i/	यादी	/prəsɑːd̪/	प्रसाद
6	/d̪iːɖ/	दीड	/kʰɑːd̪iː/	खादी	/virud̪d̪ʰ/	विरुद्ध
7	/d̪ukʰ/	दुःख	/sərd̪iː/	सर्दी		
8	/d̪ivəs/	दिवस	/bəd̪əl/	बदल		
9	/d̪upɑːr/	दुपार	/dʒələd̪/	जलद		
10	/d̪isət̪eː/	दिसते	/pəd̪ək/	पदक		
11	/d̪aːulət̪/	दौलत	/jɑːd̪əv/	यादव		
12	/d̪ɑːkʰəv/	दाखव	/pəd̪əviː/	पदवी		
13	/d̪illiː/	दिल्ली	/kʰəreːd̪iː /	खरेदी		
14	/d̪əgəd̪əg/	दगदग	/əgəd̪iː/	अगदी		
15	/d̪əbəd̪əɑ/	दबदबा	/eːkəd̪ɑː/	एकदा		
16	/d̪urust̪/	दुरुस्त	/ɑːd̪eːʃ/	आदेश		

17	/d̪ərəroːdʒ/	दररोज	/kɑːjəd̪ɑː/	कायदा
18	/d̪ilɑːsɑː/	दिलासा	/vɑːd̪əl/	वादळ
19	/d̪uʃkɑːl/	दुष्काळ	/ɦɹ̩d̪əj/	हृदय
20			/d̪əbəd̪əbɑː/	दबदबा
21			/ud̪əjoːg/	उदयोग
22			/dʒoːɖiːd̪ɑːr /	जोडीदार
23			/dʒəbɑːbəd̪ɑːr/	जबाबदार
24			/bɑːləd̪ivəs/	बालदिवस

(viii) Non Picturable words /d̪ʰ/

	Initial		Medial		Final	
Sl no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/d̪ʰəɖeː/	धडे	/əd̪ʰik/	अधिक	/ʃoːd̪ʰ/	शोध
2	/d̪ʰɑːv/	धाव	/ɑːd̪ʰɑːr/	आधार	/kroːd̪ʰ/	क्रोध
3	/d̪ʰər/	धर	/ʃrəd̪d̪ʰɑː/	श्रद्धा	/vivəd̪ʰ/	विवध
4	/d̪ʰəɖɑ/	धडा	/spərd̪ʰɑː/	स्पर्धा	/sɑːvəd̪ʰ/	सावध
5	/d̪ʰiːr/	धीर	/virud̪d̪ʰ/	विरुद्ध	/viroːd̪ʰ/	विरोध
6	/d̪ʰəɖək/	धडक	/ud̪joːg/	उद्योग		
7	/d̪ʰjɑːs/	ध्यास	/suvid̪ʰɑː/	सुविधा		

8	/d̪ʰɑːɖəs/	धाडस	/əd̪ʰikɑːriː/	अधिकारी
9	/d̪ʰəpɑːʈɑː/	धपाटा		
10	/d̪ʰɑːkəʈɑ/	धाकटा		
11	/d̪ʰɑːpɑːʈ/	धापाट		
12	/d̪ʰɑːvəpəʈuː/	धावपटू		
13	/d̪ʰurɑːla/	धुराळा		
14	/d̪ʰəkɑ buki/	धक्का -बुक्की		

(ix) Non picturable word /ʈ/

	Initial		Medial		Final	
Sl no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/ʈək/	टक	/bʰəʈək/	भटक	/luːʈ/	लूट
2	/ʈər/	टर	/kəʈut̪ɑː/	कटुता	/lɑːʈ/	लाट
3	/ʈɑːk/	टाक	/tʃuʈəkiː/	चुटकी	/viʈ/	विट
4	/ʈɑːr/	टार	/iʈəliː/	इटली	/kəʃʈ/	कष्ट
5	/ʈɑːʈɑː/	टाटा	/pʰɑːʈək/	फाटक	/kəpət/	कपट
6	/ʈɑːli/	टाळी	/d̪ʰɑːvəpəʈuː/	धावपटू	/tʃivəʈ/	चिवट
7	/ʈilak/	टिळक	/rɑːʂʈrəkul/	राष्ट्रकुल	/pisɑːʈ/	पिसाट
8	/ʈoːtsəle/	टोचले	/lɑːkuːɖəpʰɑːʈɑː/	लाकूडफाटा	/pəɦɑːʈ/	पहाट

9	/ʈeːkəɖiː/	टेकडी			/vɑːiːʈ/	वाईट
10	/ʈikɑːuː/	टिकाऊ			/ʃeːvəʈ/	शेवट
11	/ʈɑːljɑː/	टाळ्या			/səpɑːʈ/	सपाट
12					/pʰukəʈ/	फुकट
13					/tsuʈəpuʈ/	चुटपुट
14					/aːikədʒuʈ/	ऐकजुट

(x) Non Picturable /ʈʰ /

	Initial		Medial	
Sl no.	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/ʈʰeːv/	ठेव	/oːʈʰi/	ओठी
2	/ʈʰeːts/	ठेच	/ɑːʈʰəvəɖɑː/	आठवडा
3	/ʈʰəsa/	ठसा	/svət̪hsɑːʈʰi/	स्वतःसाठी
4	/ʈʰərəv/	ठरव		

(xi) Non Picturable word /ɖ/

	Medial		Final	
Sl no.	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/pɑːɖɑː/	पाडा	/d̪aːuɖ/	दौड
2	/kɑːrɖ/	कार्ड	/goːɖ/	गोड
3	/kriːɖɑː/	क्रीडा	/əvəɖ/	अवड
4	/pəɖəl/	पडल	/pəkəɖ/	पकड
5	/d̪ʰəɖək/	धडक	/kɑːpəɖ/	कापड
6	/gʰəɖəleː/	घडले	/lɑːkuːɖ/	लाकूड
7	/kəɖək/	कडक	/əvəgʰəɖ/	अवघड
8	/t̪ukəɖa:/	तुकडा		
9	/lɑːɖəkɑː/	लाडका		
10	/pəkəɖəle:/	पकडले		
11	/kʰoːɖəkər/	खोडकर		
12	/bɑːgəɖət̪e:/	बागडते		
13	/gʰərɑːkəɖe	घराकडे		
14	/ɑːʈʰəvəɖɑː/	आठवडा		
15	/dʒoːɖiːd̪ɑːr/	जोडीदार		
16	/vɦiɖioː/	व्हिडिओ		

17	/dʒʰɑːɖɑːkʰəliː/	झाडाखली

(xii) Non Picturable /ɖʰ/

	Medial		Final	
Sl no.	IPA	Marathi	IPA	Marathi
1	/puɖʰeː/	पुढे	/vɑːɖʰ/	वाढ
2	/t̪əɖʰeː/	तढे	/eːvəɖʰɑː/	एवढ
3	/piːɖʰɑː/	पीढा		
4	/tsəɖʰəv/	चढव		
5	/ləɖʰɑːiː/	लढाई		
6	/kɑːɖʰəliː	काढली		

(xiii) Non Picturable word /tʃ/

	Initial		Medial	
Sl no.	IPA	Marathi	IPA	Marathi
1	/tʃərtʃa:/	चर्चा.	/bətʃət̪/	बचत
2	/tʃət̪ur/	चतुर	/svətʃə/	स्वच्छ
3	/tʃərəbiː/	चरबी	/itʃʰa:/	इच्छा
4	/tʃəkit̪/	चकित	/vitʃa:r/	विचार
5	/tʃəkki:/	चक्की	/kərɑːtʃi:/	कराची

6	/tʃəkkər/	चक्कर	/utʃtʃɑːr/	उच्चार
7			/upətʃɑːr/	उपचार
8			/suvi:tʃr/	सुविचार

(xiv) Non Picturable Word /ts/

	Initial		Medial		Final	
Sl no	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/tsɑːl/	चाल	/kʰərts/	खर्च	/kʰeːts/	खेच
2	/tsɑːkʰ/	चाख	/bəreːts/	बरेच	/kəvəts/	कवच
3	/tsoːk/	चोक	/vərts/	वरचे	/kʰuːpəts/	खूपच
4	/tsaːugʰeː/	चौघे	/utsəl/	उचल	/t̪əsəts/	तसच
5	/tsukəlɑː/	चुकला	/pɑ:tsəvɑː/	पाचवा	/eːkɑːts/	एकाच
6					/ləvəkərts/	लवकरच

(xv) Non Picturable word /tʃʰ/

	Initial		Medial		Final	
Sl no.	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/tʃʰɑːjɑː/	छाया	/ictʃʰa:/	इच्छा	//kəctʃʰ/	कच्छ
2	/tʃʰoːʈi:/	छोटी			/svətʃʰ/	स्वच्छ
3	/tʃʰɑːt̪rə/	छात्र				

(xvi) Non PIcturable words /dʒ/

	Initial		Medial		Final	
Sl no	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/dʒəp/	जप	/kɑːdʒuː/	काजू	/lɑːdʒ/	लाज
2	/dʒəg/	जग	/kɑːldʒiː/	काळजी	/səmədʒ/	समज
3	/dʒiv/	जिव	/ədʒəb/	अजब	/gərədʒ/	गरज
4	/dʒriː/	जरी	/kəbdʒɑː/	कब्जा	/d̪ərəroːdʒ/	दररोज
5	/dʒulaːi/	जुलै	/vidʒəj/	विजय	/kərt̪uːdʒ/	कर्तूज
6	/dʒɑːt̪iː/	जाती	/idʒɑːr/	इजार	/kɔleːdʒ/	कॉलेज
7	/dʒələd̪/	जलद	/ɑːdʒɑːr/	आजार		
8	/dʒvəl/	जवळ	/lɑːdʒərɑː/	लाजरा		
9	/dʒilɦɑː/	जिल्हा	/sɑːdʒərɑː/	साजरा		
10	/dʒvɑːlɑː/	ज्वाला	/aːikədʒuʈə/	ऐकजुट		
11	/dʒjəpur/	जयपुर	/jədʒəmɑːn/	यजमान		
12	/dʒdʒoːɖiːd̪ɑːr/	जोडीदार	/gudʒərɑːt̪/	गुजरात		
13	/dʒənəloːk/	जनलोक	/ɑːdʒəkɑːl/	आजकाल		
14	/dʒivɦɑːlaː/	जिव्हाळा				

(xvii) Non Picturable word /dʒʰ/

	Initial		Medial	
Sl no	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/dʒʰəg/	झग	/oːdʒʰeː/	ओझे
2	/dʒʰeːp/	झेप	/brɑːdʒʰiːl/	ब्राझील
3	/dʒʰəreː/	झरे	/t̪udʒʰɑː/	तुझा
4	/dʒʰoːp/	झोप		
5	/dʒʰɑːk/	झाक		
6	/dʒʰɑːliː/	झाली		
7	/dʒʰɑːriː/	झारी		
8	/dʒʰiprɑː/	झिप्रा		
9	/dʒʰəlk/	झळक		
10	/dʒʰoːpəlɑː/	झोपला		
11	/dʒʰəʈpəʈ/	झटपट		
12	/dʒʰɑːɖɑːkʰəliː/	झाडाखली		

(xviii) Non Picturable /k/

	Initial		Medial		Final	
Sl no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/ka:p/	काप	/boːkɑː/	बोका	/t̪ɑːk/	ताक
2	/ka:l/	काळ	/kʰɑːkiː/	खाकी	/pik/	पिक
3	/kəpəʈ/	कपट	/pəkəɖ/	पकड	/pəd̪ək/	पदक
4	/kəʃʈɑː/	कष्टा	/eːkəts/	एकच	/bʰəʈək/	भटक
5	/kriːɖɑː/	क्रीडा	/eːkəc/	फुकट	/d̪ʰəɖək/	धडक
6	/kɔpiː/	कॉपी	/eːkəd̪ɑː	एकदा	/ʃət̪ək/	शतक
7	/kɔpʰiː/	कॉफी	/bɑːjəkoː/	बायको	/leːkʰək/	लेखक
8	/kɑːgəd̪/	कागद	/t̪ukəɖa:/	तुकडा	/bɑːlək/	बालक
9	/kada:k/	कडक	/ʃikəvə/	शिकव	/phɑːʈək/	फाटक
10	/kəʈut̪ɑː/	कटुता	/eːka:ts/	एकाच	/prəʃikʂək/	प्रशिक्षक
11	/keːvəɖʰɑː/	केवढा	/tsukəlɑː/	चुकला		
12	/kɑːpəɖ/	कापड	/pʰxks/	फॅक्स		
13	/kərɑːʈeː/	कराटे	/tʃəkkər/	चक्कर		
14	kələt̪/	कळत	/pʰeːkəliː/	फेकली		
15	/kɔleːdʒ/	कॉलेज	/ʃəkt̪iː/	शक्ती		
16	/kərɑːciː/	कराची	/ʃikəv/	शिकव		

17	/kəbdʒɑː/	कब्जा	/ʃikət̪/	शिकत
18	/kəd̪ʰiːɦi/ː	कधीही	/eːkət̪rə/	एकत्र
19	/kurkur/	कुरकुर	/sərkɑːr/	सरकार
20			/sət̪kɑːr/	सत्कार
21			/pəkəɖəleː/	पकडले
22			/aːikədʒuʈ /	ऐकजुट
23			/kʰoːkəlɑː/	खोकला
24			/gʰərɑːkəɖeː/	घराकडे
25			/kʰoːɖəkər/	खोडकर
26			/ɑːdʒkɑːl/	आजकाल
27			/vjɑːkul/	व्याकुळ
28			/d̪uʃkɑːl/	दुष्काळ
29			/rɑːʃʈrəkul/	राष्ट्रकुल
30			/eːkspreːs/	एक्स्प्रेस
31			/prət̪ikuːl/	प्रतिकूल
32			/lɑːkuːɖəpʰɑːʈɑː/	लाकूडफाटा

(xix) Non Picturable /kʰ/

	Initial		Medial		Final	
Sl no	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/kʰuːp	खूप	/sikʰ/	सिख	/bʰiːkʰ/	भीख
2	/kʰət̪/	खत	/d̪ɑːkʰəv/	दाखव	/d̪ukʰ/	दुःख
3	/kʰuʃ/	खुश	/ɑːkʰər/	आखर	/sureːkʰ/	सुरेख
4	/kʰəreː/	खरे	/leːkʰək/	लेखक	/oːlkʰ/	ओळख
5	/kʰərts/	खर्च	/roːkʰiːl/	रोखील		
6	/kʰɑːliː/	खाली	/əvəkʰəl/	अवखळ		
7	/kʰɑːd̪iː/	खादी	/oːləkʰəleː/	ओळखले		
8	/kʰɑːkiː/	खाकी				
9	/kʰuːpəts/	खूपच				
10	/kʰərɑːb/	खराब				
11	/kʰəreːd̪iː/	खरेदी				

(xx) Non picturable /g/

	Initial		Medial		Final	
Sl no	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/oːɖ/	गोड	/sɑːgər/	सागर	/dʒəg/	राग

2	/gət̪iː/	गती	/kɑːgəd̪/	कागद	/dʒəg/	जग
3	/gərv/	गर्व	/əgəd̪iː/	अगदी	/bʰɑːg/	भाग
4	/goːlaː/	गोळा	/veːgəleː/	वेगळे	/joːg/	योग
5	/gəppɑː	गप्पा	/bʰuːgoːl/	भूगोल	/rɑːg/	राग
6	/gərədʒ/	गरज	/bʰɑːgjə/	भाग्य	/t̪jɑːg/	त्याग
7	/gəriːb/	गरीब	/əlgət̪/	अलगत	/vaːit̪ɑːg/	वैताग
8	/gɑːjəb/	गायब	/bɑːgəɖət̪eː/	बागडते	/ud̪ɟjoːg/	उद्योग
9	/gə tʃɑːl/	गचाळ	/ɔgəsʈ/	ऑगस्ट	/ vibʰɑːg/	विभाग
10	/gudʒərɑːt̪/	गुजरात			/upəjoːg/	उपयोग

(xxi) Non Picturable word /gʰ/

	Initial		Medial		Final	
Sl no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/gʰɑːl/	घूस	/rəgʰu/	रघु	/bəgʰ/	बघ
2	/gʰɑːs/	घास	/əvəgʰəɖ/	अवघड		
3	/gʰɑːl/	घाल	/əpəgʰɑːt̪/	अपघात		
4	/gʰəɖəle/	घडले	/ugʰəɖəleː/	उघडले		
5	/gʰɑːt̪əlɑː/	घातला				
6	/gʰɑːbərlɑː/	घाबरला				

7	/gʰərɑːkəɖeː/	घराकडे

(xxii) Non Picturable word /s/

	Initial		Medial		Final	
Sl no	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/sur/	सुर	/d̪isət̪eː/	दिसते	/rəs/	रस
2	/sikʰ/	सिख	/pisɑːʈ/	पिसाट	/vɑːs /	वास
3	/sɑːpʰ/	साफ	/ɦəvɑːsɑː/	हवासा	/piːs/	पीस
4	/sət̪əv/	सतव	/d̪ilɑːsɑː/	दिलासा	/gʰɑːs/	घास
5	/səvəj/	सवय	/visɑːvɑː/	विसावा	/d̪ʰjɑːs/	ध्यास
6	/səpɑːʈ/	सपाट	/ɑːsuːɖ/	आसूड	/bəkʂiːs/	बक्षीस
7	/səllɑː/	सल्ला	/pərisər/	परिसर	/pʰəks/	फॅक्स
8	/səd̪ʰjɑː/	सध्या	/d̪urust̪/	दुरुस्त	/əbʰjɑːs/	अभ्यास
9	/suvid̪ʰɑː/	सुविधा	/ut̪səv/	उत्सव	/eːkspreːs/	एक्स्प्रेस
10	/sɑːdʒərɑː/	साजरा	/ut̪sɑːɦ/	उत्साह		
11	/sərəkɑːr/	सरकार	/əsəbʰjə/	असभ्य		
12	svəruːp	स्वरूप	/əsət̪ɑːt̪/	असतात		

13	/svət̪hsɑːʈʰiː/	स्वतःसाठी	/t̪ɑːlɑːsurɑːt̪/	तालासुरात
14			/svət̪hsɑːʈʰiː/	स्वतःसाठी

(xxiii) Non picturable /ʃ/

	Initial		Medial		Final	
Sl no	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/ʃoːd̪ʰə/	शोध	/ɦuʃɑːr/	हुशार	/veːʃ/	वेश
2	/ʃiʃu/	शिशु	/pʰərəʃiː/	फरशी	/əʃɑː/	यश
3	/ʃoːbʰɑː/	शोभा	/pʰɑːrəʃ/	फारशा	/kʰuʃ/	खुश
4	/ʃikʃa:/	शिक्षा	/əʃəkjə/	अशक्य	/ɑːd̪eːʃ/	आदेश
5	/ʃət̪ru/	शत्रु	/poːʃɑːkʰ/	पोशाख		
6	/ʃəbd̪/	शब्द	/ət̪iʃəj/	अतिशय		
7	/ʃəkjə/	शक्य	/ɑːlʃiː/	आळशी		
8	/ʃːvəʈ/	शेवट	/prəʃikʂək/	प्रशिक्षक		
9	/ʃət̪ək/	शतक				
10	/ʃəkt̪iː/	शक्ती				
11	/ʃikəv/	शिकव				
12	/ʃikət̪/	शिकत				

13	/ʃivəliː/	शिवली
14	/ʃɑːbɑːs/	शाबास

(ii) The selected picturable words were provided to 3 speech language pathologist (SLP) for content validation. 3 SLP’s were requested to judge and select the words based on iconicity.

A total of 500 picturable words for which 1500 pictures were selected to develop the material from the above mentioned resources, out of the 500 words, 480 were considered in the final word list. The remaining picturable words were excluded from the list, as the judges rated them ‘0’ as they were not iconic, and not familiar. The details of the words considered across three different positions is in given in table 4.11

Table 4.11

Details of total number of picturable words across the different place and manner of articulation for the articulation drill book in Marathi

	P	Bilabial			Dental			Alveolar			Retroflex			Palatal			Velar			Total		
		I	**M**	**F**	**I**	**M**	**F**	**I**	**M**	**F**	**I**	**M**	**F**	**I**	**M**	**F**	**I**	**M**	**F**	**I**	**M**	**F**
Mn	**S**	64	41	11	30	32	16	-	-	-	14.	38	23	-	-	-	47	40	18	155	151	68
	A	-	-	-	-	-	-	5	2	2	-	-	-	31	15	4	-	-	-	36	17	6
	F	-	-	-	-	-	-	16	12	7	-	-	-	7	5	-	-	-	-	23	17	7
	T	64	41	11	30	32	16	21	14	9	14	38	23	38	20	4	47	40	18	**480**		

Note : P-Place, Mn – Manner, I – initial position, M – medial position, F- final position, S – Stops, A – Affricate, F – Fricative, T – Total

A total number of 480 picturable words were selected, out of which 374 were stops, 59 were affricates, and 47 were fricatives. Further, the category under stops,

(a) Among bilabials, 64 words were in initial position; 41 in medial position, and 11 in final position. The details of the words considered based on the phoneme for bialbals is given in table 4.12 below

Table 4.12

Total number of picturable words selected for target phoneme for bilabials

Bilabials	Words (picturable)		
	I	M	F
/p/	32	16	5
/b/	17	16	1
/p^h/	9	6	3
/b^h/	6	3	2

(b) Among dental, 30 words in initial position, 32 in medial position, and 16 in final position. The details of the words considered based on the phoneme for dentals is given in table 4.13 below.

Table 4.13

Total number of picturable words selected for target phoneme for dentals.

Dentals	Words (picturable)		
	I	M	F
/t̪/	7	16	9
/t̪ʰ/	3	1	2
/d̪/	17	12	3
/d̪ʰ/	3	3	2

(c) Among retroflex, 14 words in initial position, 38 in medial position, and 23 in final position.The details of the words considered based on the phoneme for retroflex is given in table 4.14 below.

Table 4.14

Total number of picturable words selected for target phoneme for retroflex.

Retroflex	Words (non-picturable)		
	I	M	F
/t/	8	17	11
/tʰ/	-	-	8
/d/	5	19	3
/dʰ/	1	2	1

(d) Among velar, 47 words in initial position, 40 in medial position, and 18 in final position.The details of the words considered based on the phoneme for velar is given in table 4.15 below.

Table 4.15

Total number of picturable words selected for target phoneme for velar

Velar	Words (picturable)		
	I	M	F
/k/	22	21	13
/kʰ/	7	3	-
/g/	14	14	4
/gʰ/	4	2	1

Further, the category under affricates,

(a) Among alveolar, 5 words were in initial position; 2 in medial position, and 2 in final position. The details of the words considered based on the phoneme for alveolar is given in table 4.16 below.

Table 4.16

Total number of picturable words selected for target phoneme for alveolar

Alveolar	Words (picturable)		
	I	M	F
/ts/	5	2	2

Among palatal, 31 words were in initial position, 15 in medial position, and 4 in final position. The details of the words considered based on the phoneme for palatal is given in table 4.17 below.

Table 4.17.

Total number of picturable words selected for target phoneme for palatal.

Palatal	Words (picturable)		
	I	M	F
/tʃ/	7	2	3
/tʃʰ/	6	-	-
/dʒ/	9	13	1
/dʒʰ/	9	-	-

Further, the category under fricatives,

(a) Among alveolar, 16 words were in initial position; 12 in medial position, and 7 in final position. The details of the words considered based on the phoneme for alveolar is given in table 4.18 below.

Table 4.18.

Total number of picturable words selected for target phoneme for alveolar.

Alveolar	Words (non-picturable)		
	I	M	F
/s/	16	12	7

(b) Palatal, 7 words in initial position, and 5 in medial position. The details of the words considered based on the phoneme for palatal is given in table 4.19 below.

Table 4.19.

Total number of picturable words selected for target phoneme for palatal.

Palatal	Words (picturable)		
	I	M	F
/ʃ/	7	5	-

The detailed word list for picturable word is given in table 4.20.

Table 4.20.

Picturable word list and pictures of these words are provided in Appendix (2) in CD.

(i) Picturable word /p/

	Initial		Medial		Final	
SL.no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/pɑːv/	पाव	/ʈoːpiː/	टोपी	/ʈeːp/	टेप
2	/pɑːts/	पाच	/tʃəppəl/	चप्पल	/kəp/	कप
3	/pəʃu/	पशु	/kəpɑːʈ/	कपाट	/dʒiːp/	जीप
4	/peːlɑː/	पेला	/poːpəʈ/	पोपट	/pɑːiːp/	पाईप
5	/peːɖɑː/	पेडा	/dʒʰoːpəɖiː/	झोपडी	/kuluːp/	कुलूप
6	/peːruː/	पेरू	/sʈeːplər/	स्टेपलर		
7	/paːisɑː/	पैसा	/sipɑːɦiː/	सिपाही		
8	/puriː/	पुरी	/dʒʰoːpalɑː/	झोपाळा		

9	/pəkʂiː/	पक्षी	/ʈoːpliː/	टोपली
10	/pɑːʈ/	पाट	/peːpər/	पेपर
11	/peːʈiː/	पेटी	/bʰoːpəlaː/	भोपळा
12	/pəʈʈɑː/	पट्टा	/rɑːʂəʈrəpət̪iː/	राष्ट्रपिता
13	/pəriː/	परी	/ʃəpət̪ʰ/	शपथ
14	/pɑːl/	पाल	/pʰuːʈəpɑːt̪ʰ/	फूटपाथ
15	/poːt/	पोट	/d̪əpt̪ər/	दप्तर
16	/pərd̪ɑː/	परदा	/kəpɑːʈ/	कपाट
17	/pɑːpəɖ/	पापड	/t̪əpəsjɑː/	तपस्या
18	/ pəpəiː/	पपई		
19	/puruʂ/	पुरुष		
20	/ poːlis/	पोलिस		
21	/pɑːlək/	पालक		
22	/pəgəɖiː/	पगडी		
23	/pɑːt̪eːlɑː/	पातेला		
24	/piʃəviː/	पिशवी		
25	/pɑːjəriː/	पायरी		
26	/pɹ̩t̪ʰviː/	पृथ्वी		
27	/pivəla/	पिवळा		

28	/poːlpɑːʈ/	पोळपाट
29	/pərivɑːr/	परिवार
30	/peːʈikoːʈ/	पेटिकोट
31	/pɑːkəli/	पाकळी
32	/pitsəɑːriː/	पिचकारी

(ii) Picturable word /b/

	Initial		Medial		Final	
SL.no		**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/buʈ/	बुट	/ɖəbɑː/	डबा	/gulɑːb/	गुलाब
2	/bɑːl/	बाळ	/koːbiː/	कोबी		
3	/bəs/	बस	/d̪ʰoːbiː/	धोबी		
4	/bɑːg/	बाग	/dʒʰeːbrɑː/	झेब्रा		
5	/biskiʈ/	बिस्किट	/dʒəleːbiː/	जलेबी		
6	/bəd̪ək/	बदक	/ʈeːbəl/	टेबल		
7	/bɑːd̪əliː/	बादली	/rəbər/	रबर		
8	/bəkəriː/	बकरी	/t̪əbəlɑː/	तबला		
9	/bɔʈələ/	बॉटल	/ʃərəbət̪/	शरबत		
10	/bud̪d̪ʰə/	बुद्ध	/kəbut̪ər/	कबुतर		

11	/boːʈ/	बोट	/kʰoːɖərəbər/	खोडरबर
12	/bərpʰə/	बर्फ	/pʰuʈəbɔl/	फुटबॉल
13	/bəʈɑːʈɑː/	बटाटा	/tsɑːbuːkə/	चाबूक
14	/baːiləgɑːɖiː/	बैलगाडी	/dʒʰəbəlɑː/	झबला
15	/bɑːɦuliː/	बाहुली	/kəbəɖɖiː/	कबड्डी
16	/beːlʈə/	बेल्ट	/əgərbət̪t̪iː/	अगरबत्ती
17	/bɑːdʒərɑː/	बाजरा		
18	/bəd̪ək/	बदक		
19	/bərpʰə/	बर्फ		

(iii) Picturable word /pʰ/

	Intial		Medial		Final	
SL.no	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/pʰugɑː/	फुगा	/tʃɑːpʰɑː/	चाफा	/bərpʰ/	बर्फ
2	/pʰəla/	फळा	/gupʰɑː/	गुफा	/sərpʰ/	सर्फ
3	/pʰɑːʈəkə/	फाटक	/soːpʰɑː/	सोफा	/dʒirɑːpʰ/	जिराफ
4	/pʰɑːiːl/	फाईल	/ɖəpʰəliː/	डफली		
5	/pʰridʒ/	फ्रिज	/rɑːjəpʰəl/	रायफल		
6	/pʰrɔk/	फ्रॉक	/siːt̪ɑːpʰəl/	सीताफळ		
7	/pʰɑːlud̪ɑː/	फालुदा				

8	/pʰuʈəbɔl/	फुटबॉल
9	/pʰuləpɑːkʰəruː/	फुलपाखरू

(iv) Picturable word /bʰ/

	Initial		Medial		Final	
SL.no	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/bʰuːt̪/	भूत	/ɑːbʰɑːl/	आभाळ	/dʒiːbʰ/	जीभ
2	/bʰɑːlu/	भालु	/ʃubʰə lɑːbʰ/	शुभ लाभ	/ʃubʰ lɑːbʰ/	शुभ लाभ
3	/bʰɑːdʒiː/	भाजी	/d̪ud̪ʰiːbʰoːla/	दुधीभोळा		
4	/bʰɑːrət̪/	भारत				
5	/bʰoːpəla/	भोपळा				
6	/bʰəʈʈədʒ iː/	भट्टजी				

(v) Picturable word /t̪/

	Initial		**Medial**		**Final**	
SL.no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/t̪ɑːʈ/	ताट	/tʃʰɑːt̪iː/	छाती	/ʃeːt̪/	शेत
2	/t̪ɑːreː/	तारे	/ɦət̪t̪iː/	हत्ती	/sɑːt̪/	सात
3	/t̪əbəlɑ/ː	तबला	/pɹ̩t̪viː/	पृत्वी	/ɦɑːt̪/	हात
4	/t̪ərɑːdʒuː/	तराजू	/kurt̪ɑː/	कुर्ता	/d̪ɑːt̪/	दात

5	/t̪əlɑːv/	तलाव	/ʃəpət̪ʰ/	शपथ	/bʰuːt̪/	भूत
6	/t̪ikiːʈ/	तिकीट	/d̪əpt̪ər/	दप्तर	/gəvət̪/	गवत
7	/t̪əpəsjɑː/	तपस्या	/d̪ʰoːt̪ər/	धोतर	/bʰɑːrət̪/	भारत
8			/pɑːt̪eːlɑː/	पातेला	/pərvət̪/	पर्वत
9			/kəbut̪ər/	कबुतर	/ʃərəbət̪/	शरबत
10			/pust̪əkə/	पुस्तक		
11			/kuʃət̪iː/	कुशती		
12			/ɦɑːt̪oːɖiː/	हातोडी		
13			/pɑːt̪eːlɑː/	पातेला		
14			/kʰɑːrut̪ɑːiː/	खारुताई		
15			/siːt̪ɑːpʰəl/	सीताफळ		
16			/rɑːʂʈrəpit̪ɑː/	राष्ट्रपिता		
17			/əgərəbət̪t̪iː/	अगरबत्ती		

(vi) Picturable word /t̪ʰ/

	Intial		Medial		Final	
SL.no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/t̪ʰəvɑː/	थवा	/vid̪ʰjɑːrt̪ʰiː/	विध्यार्थी	/ʃəpət̪ʰ/	शपथ
2	/t̪ʰaːiliː/	थैली			/pʰuːʈəpɑːt̪ʰ/	फूटपाथ
3	/t̪ʰeːʈər/	थेटर				

(vii) Picturable word /d̪/

	Initial		Medial		Final	
SL.no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/d̪ɑːt̪/	दात	/tʃaːud̪ɑː/	चौदा	/səpʰe:d̪/	सफेद
2	/d̪əɦɑː/	दहा	/gɑːd̪iː/	गादी	/ɦələd̪/	हळद
3	/d̪ud̪ʰ/	दुध	/bəd̪ək/	बदक	/prəsɑ:d̪/	प्रसाद
4	/d̪ɑːr/	दार	/pərəd̪ɑː/	परदा		
5	/d̪aːuɖ/	दौड	/tʃɑːd̪ər/	चादर		
6	/d̪ɑːɖʰ/	दाढ	/bɑːd̪əliː/	बादली		
7	/d̪əɦiː/	दही	/pərd̪ɑː/	पर्दा		
8	/d̪oːriː/	दोरी	/bud̪d̪ʰə/	बुद्ध		
9	/d̪ivɑː/	दिवा	/tʃʰid̪rə/	छिद्र		
10	/d̪əgəɖ/	दगड	/əd̪rəkə/	अद्रक		
11	/d̪əsərɑː/	दसरा	/dʒɑːd̪uːgər/	जादूगर		
12	/d̪eːvəgʰər/	देवघर	/rɑːd̪ɑːs/	रादास		
13	/d̪əpt̪ər/	दप्तर	/vɑːɖʰəd̪ivəs/	वाढदिवस		
14	/d̪ərgɑː/	दर्गा	/ɑːd̪ivɑːsiː/	आदिवासी		
15	/d̪ivɑːli/	दिवाळी				
16	/d̪ərəvɑːdʒɑː/	दरवाजा				
17	/d̪ud̪ʰiːbʰoːla/	दुधीभोळा				

(viii) Picturable word /d̪ʰ/

	Inital		Medial		Final	
SL.no	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/d̪ʰoːbiː/	धोबी	/vid̪ʰjɑːrt̪ʰiː/	विध्यार्थी	/d̪ud̪ʰə/	दुध
2	/d̪ʰoːt̪ər/	धोतर	/d̪ud̪ʰiːbʰoːpla/	दुधीभोपळा	/bud̪d̪ʰ/	बुद्ध
3	/d̪ʰɑːgɑː/	धागा	/pʰɑːlud̪ɑ/ː	फालुदा		

(ix) Picturable word /t/

	Initial		Medial		Final	
SL.no	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/ʈeːpə/	टेप	/peːʈiː/	पेटी	/boːʈ/	बोट
2	/ʈoːpiː/	टोपी	/pɑːʈiː/	पाटी	/buʈ/	बुट
3	/ʈeːbəl/	टेबल	/pəʈʈɑː/	पट्टा	/poːʈ/	पोट
4	/ʈɑːl/	टाळ	/tʃʰoːʈɑː/	छोटा	/t̪ɑːʈ/	ताट
5	/ʈɑːli/	टाळी	/kəʈər/	कटर	/koːʈ/	कोट
6	/ʈoːpəliː/	टोपली	/t̪ʰeːʈər/	थेटर	/kəpɑːʈ/	कपाट
7	/ʈɔrtʃ/	टॉर्च	/pʰɑːʈək/	फाटक	/poːpəʈ/	पोपट
8	/ʈrək/	ट्रक	/bəʈɑːʈɑː/	बटाटा	/beːlʈ/	बेल्ट
9			/poːlpɑːʈ/	पोळपाट	/rɔkeːʈ/	रॉकेट
10			/suʈəkeːs/	सुटकेस	/biskiʈ/	बिस्किट

11			/bɔʈəl/	बॉटल	/poːlpɑːʈ/	पोळपाट
12			/ʈrɔkʈər/	ट्रॅक्टर		
13			/skuːʈər/	स्कूटर		
14			/peːʈikoːʈ/	पेटिकोट		
15			/rɑːʂʈrəpit̪ɑː/	राष्ट्रपिता		
16			/pʰuʈəbɔl/	फुटबॉल		
17			/bʰəʈʈədʒiː/	भट्टजी		

(x) Picturable word /ʈʰ/

	Final	
SL.no	IPA	Marathi
1	/pɑːʈʰ/	पाठ
2	/sɑːʈʰ/	साठ
3	/ɑːʈʰ/	आठ

(xi) Picturable word /d/

	Inital		**Medial**		**Final**	
SL.no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/ɖɑːkuː/	डाकू	/lɑːɖuː/	लाडू	/dʒʰɑːɖ/	झाड
2	/ɖoːsɑː/	डोसा	/peːɖɑː/	पेडा	/d̪əgəɖ/	दगड

3	/ḍəbbɑː/	डब्बा	/sɑːḍiː/	साडी	/papad/	पापड
4	/ḍukkər/	डुक्कर	/ʃiḍiː/	शिडी		
5	/ḍəpʰəliː/	डफली	/tʃʰəḍiː/	छडी		
6			/gɑːḍiː/	गाडी		
7			/pəgəḍiː/	पगडी		
8			/dʒəbəḍɑː/	जबडा		
9			/iḍəliː/	इडली		
10			/kəḍɑːiː/	कडाई		
11			/ɦəḍḍiː/	हड्डी		
12			/kʰiḍəkiː/	खिडकी		
13			/reːḍioː/	रेडिओ		
14			/ɦɑːt̪oːḍiː/	हातोडी		
15			/dʒʰoːpəḍiː/	झोपडी		
16			/kəbəḍḍiː/	कबड्डी		
17			/kʰoːḍrəbər/	खोडरबर		
18			/baːiləgɑːḍiː/	बैलगाडी		
19			/ɑːgəgɑːḍiː/	आगगाडी		

(xii) Picturable word /dʰ/

	Inital		Medial		Final	
SL.no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/ɖʰoːkəla/	ढोकळा	/gɑːɖʰəv/	गाढव	/d̪ɑːɖʰ/	दाढ
2			/vɑːɖʰəd̪ivəs/	वाढदिवस		

(xiii) Picturable word /tʃ/

	Intial		Medial		Final	
SL.no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/tʃɑːr/	चार	/kətʃoːriː/	कचोरी	/liːtʃ/	लीच
2	/tʃəɦɑː/	चहा	/kʰitʃəɖiː/	खिचडी	/tʃərtʃ/	चर्च
3	/tʃɑːkuː/	चाकू			/ʈɔrtʃ/	टॉर्च
4	/tʃikuː/	चिकू				
5	/tʃəppəl/	चप्पल				
6	/tʃikkiː/	चिक्की				
7	/tʃɔkəleːʈ/	चॉकलेट				

(xiv) Picturable word /ts/

	Inital		Medial		Final	
SL.no	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/tsɑːkə/	चाक	/kətsərɑː/	कचरा	/kʰeːts/	खेच
2	/tsɑːpʰɑː/	चाफा	/pitsəkɑːriː/	पिचकारी	/pɑːts/	पाच
3	/tsaːud̪ɑː/	चौदा				
4	/tsɑːbuːkə/	चाबूक				
5	/tsəpɑːt̪iː/	चपाती				

(xv) Picturable word / tʃʰ/

	Initial	
SL.no	IPA	Marathi
1	/tʃʰoːʈɑː/	छोटा
2	/tʃʰəɖiː/	छडी
3	/tʃʰɑːt̪iː/	छाती
4	/tʃʰət̪iːs/	छतीस
5	/tʃʰət̪riː/	छत्री
6	/tʃʰid̪r/	छिद्र

(xvi) Picturable word /dʒ/

	Intial		Medial		Final	
SL.no	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/dʒəg/	जग	/kɑːdʒuː/	काजू	/pʰridʒ/	फ्रिज
2	/dʒəl/	जल	/rɑːdʒɑː/	राजा		
3	/dʒibʰ/	जिभ	/bʰɑːdʒiː/	भाजी		
4	/dʒiːrɑː/	जीरा	/gədʒərɑː/	गजरा		
5	/dʒoːkər/	जोकर	/gɑːdʒər/	गाजर		
6	/dʒəleːbiː/	जलेबी	/t̪ərɑːdʒuː/	तराजू		
7	/dʒəbəɖɑː/	जबडा	/kʰədʒuːr/	खजूर		
8	/dʒirɑːpʰ/	जिराफ	/bɑːdʒərɑː/	बाजरा		
9	/dʒɑːd̪uːgər/	जादूगर	/kɑːdʒəl/	काजळ		
10			/ədʒəgər/	अजगर		
11			/kidʒoːriː/	किजोरी		
12			/d̪ərəvɑːdʒɑː/	दरवाजा		
13			/bʰəʈʈədʒiː/	भट्टजी		

(xvii) Picturable word / dʒʰ /

	Intial	
SL.no	IPA	Marathi
1	/dʒʰɑːɖ/	झाड
2	/dʒʰəgɑː/	झगा
3	/dʒʰoːli/	झोळी
4	/dʒʰəbəlɑː/	झबला
5	/dʒʰɑːlər/	झालर
6	/dʒʰeːbrɑː/	झेब्रा
7	/dʒʰurəl/	झुरळ
8	/dʒʰoːpəɖiː/	झोपडी
9	/dʒʰoːpɑːla/	झोपाळा

(xviii) Picturable word /k/

	Initial		Medial		Final	
SL.no	IPA	Marathi	IPA	Marathi	IPA	Marathi
1	/kəp/	कप	/tʃikuː/	चिकू	/eːkə/	एक
2	/kɑːr/	कार	/vəkiːlə/	वकील	/keːk/	केक
3	/koːbiː/	कोबी	/kəʈər/	कटर	/tʃɑːk/	चाक

4	/kɑːdʒuː/	काजू	/bəkəriː/	बकरी	/bəd̪ək/	बदक
5	/koːʈ/	कोट	/t̪ikiːʈ/	तिकीट	/pɑːlək/	पालक
6	/kurt̪ɑː/	कुर्ता	/dʒoːkər/	जोकर	/pʰɑːʈək/	फाटक
7	/keːsər/	केसर	/əkərɑː/	अकरा	/leːkʰək/	लेखक
8	/kuluːp/	कुलूप	/pɑːkəli/	पाकळी	/bɑːlək/	बालक
9	/kəpɑːʈ/	कपाट	/suʈəkeːs/	सुटकेस	/tʃɑːbuːk/	चाबूक
10	/krikeːʈ/	क्रिकेट	/peːʈikoːʈ/	पेटिकोट	/pust̪ək/	पुस्तक
11	/kəɖɑːiː/	कडाई	/sɑːiːkəl/	साईकल	/ʃikʂək/	शिक्षक
12	/kəbuːt̪ər/	कबूतर	/pitʃəkɑːriː/	पिचकारी	/tʃikkiː/	चिक्की
13	/kəbəɖɖiː/	कबड्डी	/sərkəs/	सर्कस	/əd̪rək/	अद्रक
14	/kɑːrəleː/	कारले	/biskiʈ/	बिस्किट		
15	/kut̪rɑː/	कुत्रा	/rɔkeːʈ/	रॉकेट		
16	/kɑːvəla/	कावळा	/skuːʈər/	स्कूटर		
17	/kɑːdʒəl/	काजळ	/rikʂɑː/	रिक्षा		
18	/kɑːsəv/	कासव	/skuːl/	स्कूल		
19	/kidʒoːriː/	किजोरी	/ɖukkər/	डुक्कर		
20	/kuʃət̪iː/	कुशती	/ʈrɔkʈər/	ट्रॅक्टर		
21	/kətʃoːriː/	कचोरी	/tʃɔkəleːʈ/	चॉकलेट		
22	/kɑːrɑːgɹ̩ɦə/	कारागृह				

(xxi) Picturable word /kʰ/

	Intial		Medial	
SL.no	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/kʰeːtʃ/	खेच	/rɑːkʰiː/	राखी
2	/kʰiːr/	खीर	/sɑːkʰər/	साखर
3	/kʰədʒuːr/	खजूर	/pʰuləpɑːkʰəruː/	फुलपाखरू
4	/kʰitʃəɖiː/	खिचडी		
5	/kʰiɖəkiː/	खिडकी		
6	/kʰɑːrut̪ɑːiː/	खारुताई		
7	/kʰoːɖərəbər/	खोडरबर		

(xx) Picturable word /g/

	Intial		Medial		Final	
SL.no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/gɑːl/	गाल	/pʰuːgɑː/	फूगा	/dʒəg/	जग
2	/goːl/	गोल	/d̪ʰɑːgɑː/	धागा	/bɑːg/	बाग
3	/gupʰɑː/	गुफा	/dʒʰəgɑː/	झगा	/ɑːg/	आग
4	/gul/	गुळ	/joːgɑː/	योगा	/bxg/	बॅग
5	/gəla/	गळा	/d̪əgəɖ/	दगड		
6	/gɑːɖiː/	गाडी	/poːrəgɑː/	पोरगा		

7	/gɑːd̪iː/	गादी	/pəgəɖiː/	पगडी
8	/gəvət̪/	गवत	/ədʒəgər/	अजगर
9	/gədʒərɑː/	गजरा	/dʒɑːd̪uːgər/	जादूगर
10	/gɑːdʒərə/	गाजर	/baːiləgɑːɖiː/	बैलगाडी
11	/gɑːɖʰəv/	गाढव	/ɑːgəgɑːɖiː/	आगगाडी
12	/gulɑːb/	गुलाब	/əgərəbət̪t̪iː/	अगरबत्ती
13	/glɑːs/	ग्लास	/kɑːrɑːgɹ̩ɦə/	कारागृह
14	/gxs/	गॅस	/rəsəgullɑː/	रसगुल्ला

(xxi) Picturable word /gʰ/

	Intial		Medial		Final	
SL.no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/gʰər/	घर	/d̪eːvəgʰərə/	देवघर	/vɑːgʰ/	वाघ
2	/gʰuːs/	घूस	/gʰɑːgʰərɑː/	घाघरा		
3	/gʰəsɑː/	घसा				
4	/gʰərət̪eː/	घरटे				
5	/gʰɑːgʰərɑː/	घाघरा				

(xxii) Picturable word /s/

	Intial		Medial		Final	
SL.no	**IPA**	**Marathi**	**IPA**	**Marathi**	**IPA**	**Marathi**
1	/sɑːt̪/	सात	/paːisɑː/	पैसा	/viːs/	वीस
2	/sɑːʈʰ/	साठ	/ɖoːsɑː/	डोसा	/gxs/	गॅस
3	/sɑːɖiː/	साडी	/keːsər/	केसर	/tʃoːviːs/	चोवीस
4	/soːpʰɑː/	सोफा	/d̪əsərɑː/	दसरा	/poːlis/	पोलिस
5	/səpʰeːd̪/	सफेद	/prəsɑːd̪/	प्रसाद	/glɑːs/	ग्लास
6	/sɑːkʰər/	साखर	/pisɑːrɑː/	पिसारा	/ləssiː/	लस्सी
7	/səkɑːl/	सकाळ	/rəst̪eː/	रस्ते	/sərkəs/	सर्कस
8	/sərpʰ/	सर्फ	/ləssiː/	लस्सी		
9	/skuːl/	स्कूल	/t̪əpəsjɑː/	तपस्या		
10	/sveːʈər/	स्वेटर	/biskiʈ/	बिस्किट		
11	/sərkəs/	सर्कस	/ɑːd̪ivɑːsiː/	आदिवासी		
12	/skuːʈər/	स्कूटर	/rəsəgullɑː/	रसगुल्ला		
13	/sʈeːpələr/	स्टेपलर				
14	/suʈəkeːs/	सुटकेस				
15	/sɑːiːkəl/	साईकल				
16	/siːt̪ɑːpʰəl/	सीताफळ				

(xxiii) Picturable word /ʃ/

	Initial		Medial	
SL.no	IPA	Marathi	IPA	Marathi
1	/ʃɑːiː/	शाई	/pəʃu/	पशु
2	/ʃeːt̪iː/	शेती	/uʃiː/	उशी
3	/ʃiv/	शिव	/piʃəvi/ː	पिशवी
4	/ʃiɖiː/	शिडी	/kuʃət̪iː/	कुशती
5	/ʃəpət̪ʰ/	शपथ	/rɑːʂʈrəpit̪ɑː/	राष्ट्रपिता
6	/ʃərəbət̪/	शरबत		
7	/ʃikʂək/	शिक्षक		
8	/ʃubʰə lɑːbʰ/	शुभ लाभ		

4.1. (c) To compile paired words loaded with pressure consonants in Marathi language.

The third objective of the study was to compile the paired words for pressure consonants in Marathi language. Paired words were those words which have different consonants and the same vowel or, different vowels and the same consonant. The prepared paired words were provided to 3 speech language pathologist (SLP) for content validation. 3 SLP’s were requested to judge and rate the words based on meaningfulness.

A total of 238 were selected to develop paired word list for pressure consonants in Marathi, out of which 228 was considered in the final paired word list.

The remaining paired words were excluded from the list, as the judges rated them ‘0’ due to their non-meaningfulness. The details of the paired word list in across place and manner of articulation is listed below in table 4.21.

Table 4.21

Details of total number of paired words across the different place and manner of articulation for the articulation drill book in Marathi.

Place / **Manner**	**Bilabial**	**Dental**	**Alveolar**	**Retroflex**	**Palatal**	**Velar**	**Total**
Stops	38	46	-	30	-	57	171
Affricates	-	-	6	-	29	-	35
Fricatives	-	-	15	-	7	-	22
Total	38	46	21	30	36	57	**228**

A total number of 228 words were selected, out of which were 171 stops, 35 were affricates and 22 were fricative. Further, the category under stops included

(a) 38 were **bialbial.** The details of the paired words considered based on the phoneme for bialbals is given in table 4.22 below.

Table 4.22.

Total number of paired words selected for target phoneme for bilabial.

Bilabials	Paired words
/p/	11
/b/	11
/pʰ/	5
/bʰ/	11

b) 46 were **dental**.The details of the paired words considered based on the phoneme for dentals is given in table 4.23. below.

Table 4.23

Total number of paired words selected for target phoneme for dentals.

Dentals	Paired words
/t̪/	14
/t̪ʰ/	10
/d̪/	14
/d̪ʰ/	8

(c) 330 were **retroflex.** The details of the paird words considered based on the phoneme for retroflex is given in table 4.24 below.

Table 4.24

Total number of paired words selected for target phoneme for dentals.

Retroflex	Paired words
/t/	14
/tʰ/	8
/d/	4
/dʰ/	4

d) 57 were **velar.** The details of the paired words considered based on the phoneme for velar is given in table 4.25 below.

Table 4.25

Total number of paired words selected for target phoneme for velar.

Velar	Paired words
/k/	21
/kʰ/	15
/g/	13
/gʰ/	8

Further, the category under affricates included

(a) 6 were **alveolar**. The details of the paired words considered based on the phoneme for alveolar is given in table 4.26 below.

Table 4.26

Total number of paired words selected for target phoneme for alveolar.

Alveolar	Paired word
/ts/	6

(b) 29 were **Palatal.** The details of the paired words considered based on the phoneme for palatal is given in table 4.27 below.

Table 4.27

Total number of paired words selected for target phoneme for palatal.

Palatal	Paired words
/tʃ/	5
/tʃʰ/	9
/dʒ/	7
/dʒʰ/	8

Further, the category under fricatives included

(a) 15 were **alveolar**.The details of the words considered paired word based on the phoneme for alveolar is given in table 4.28 below.

Table 4.28

Total number of paired words selected for target phoneme for alveolar.

Alveolar	Paired word
/s/	15

b) 7 were **palatal**. The details of the paired words considered based on the phoneme for palatal is given in table 4.29 below.

Table 4.29

Total number of paired words selected for target phoneme for palatal.

Palatal	Paired word
/ʃ/	7

The detailed word list for paired word is given in Table 4.30.

Table 4.30

Paired word list

(i) Paired Word /p/

Sl.no	IPA	Paired word
1	/pɑːv-bʰɑːv/	पाव-भाव
2	/peːɖɑː- veːɖɑː/	पेडा- वेडा
3	/poːʈ-kʰoːʈ/	पोट-खोट
4	/pət̪ʰ- kʰət̪ʰ/	पथ -खथ
5	/pəʈʈɑː - kəʈʈɑː/	पट्टा - कट्टा
6	/pɑːʈiː-kɑːʈiː/	पाटी-काटी
7	/pərɑːt̪- gʰərɑːt̪/	परात- घरात
8	/poːliː-goːliː/	पोळी-गोळी
9	/pərɑːt̪- vərɑːt̪/	परात- वरात

10	/pəkəɖ- əkəɖ/	पकड- अकड
11	/pəsɑːrɑː -kəsɑːrɑː/	पसारा-कसारा

(ii) Paired Word /b/

Sl.no	IPA	Paired word
1	/buʈ - suʈ/	बुट - सुट
2	/beːt̪- kʰeːt̪/	बेत- खेत
3	/bəs-kʰəs/	बस-खस
4	/boːr- poːr/	बोर- पोर
5	/bɑːiː -ɑːiː/	बाई -आई
6	/boːʈ- kʰoːʈ/	बोट- खोट
7	/bɑːlu - kɑːlu/	बाळु - काळु
8	/boːkɑː- kʰoːkɑː/	बोका- खोका
9	/bɑːɦeːr -ɑːɦeːr/	बाहेर -आहेर
10	/bəkəriː-tsəkəriː/	बकरी-चकरी
11	/bɑːdʒɑːr- ɑːdʒɑːr/	बाजार- आजार

(iii) Paired Word /pʰ/

Sl.no	IPA	Paired word
1	/pʰɑːr - kɑːr/	फार - कार
2	/pʰoːɖ- t̪ʰoːɖ/	फोड- थोड
3	/pʰəli:- kəli:/	फळी- कळी.
4	/pʰəʈəkɑː - tsəʈəkɑː/	फटका - चटका
5	/pʰɑːjəd̪ɑː - kɑːjəd̪ɑː/	फायदा - कायदा

(iv) Paired Word /bʰ/

Sl.no	IPA	Paired word
1	/bʰuːt̪ - puːt̪/	भूत - पूत
2	/bʰɑːg- vɑːgʰ/	भाग- वाघ
3	/bʰər - kər/	भर - कर
4	/bʰɑːr - kɑːr/	भार - कार
5	/bʰik-vik/	भिक-विक
6	/bʰəʈʈiː - kəʈʈiː/	भट्टी - कट्टी
7	/bʰɑːt̪-sɑːt̪/	भात-सात
8	/bʰɑːdʒ-kʰɑːdʒ/	भाज-खाज
9	/bʰɑːʃɑː- ɑːʃɑː/	भाषा- आशा
10	/bʰəʈək - tsəʈək/	भटक - चटक

11	/bʰɑːkʰəriː- tsɑːkəriː/	भाखरी- चाकरी

(v) Paired Word /t̪/

Sl.no	IPA	Paired word
1	/t̪ər- vər/	तर - वर
2	/t̪ər - kər/	तर - कर
3	/t̪ɑːr-kɑːr/	तार - वार
4	/t̪ɑːr - vɑːr/	तार-कार
5	/t̪ɑːs - vɑːs/	तास - वास
6	/t̪ɑːl - pɑːl /	ताल - पाल
7	/t̪ɑːk -vɑːk/	ताक -वाक
8	/t̪əvɑː - d̪əvɑː/	तवा - दवा
9	/t̪əvɑː -tsɑːvɑː/	तवा -चावा
10	/t̪ɑːʈʰ - pɑːʈʰ/	ताठ - पाठ
11	/t̪ɑːreː - sɑːreː/	तारे - सारे
12	/t̪ɑːʒiː-bʰɑːdʒiː/	ताजी-भाजी
13	/t̪əbəlɑː - dʒʰəbəlɑː/	तबला - झबला
14	/t̪əɖəkɑː - pʰəɖəkɑː/	तडका - फडका

(vi) Paired Word /t̪ʰ/

Sl.no	IPA	Paired word
1	/t̪ʰər-vər/	थर-वर
2	/t̪ʰeːʈ- geːʈ/	थेट- गेट
3	/t̪it̪ʰə - iːt̪ʰə/	तिथ - ईथ
4	/t̪ʰəl - vəl/	थळ - वळ
5	/t̪ʰuk - sukʰ/	थुक - सुख
6	/kət̪ʰɑː - prət̪ʰɑː/	कथा - प्रथा
7	/t̪ʰoːɖɑː- soːɖɑː/	थोडा- सोडा
8	/t̪ʰəvɑː - bʰɑːvɑː/	थवा - भावा
9	/t̪ʰəppiː - dʒʰəppiː/	थप्पी - झप्पी
10	/t̪ʰəkəvɑː- ləkəvɑː/	थकवा- लकवा

(vii) Paired Word /d̪/

Sl.no	IPA	Paired word
1	/d̪əg-bəg/	दग-बग
2	/d̪ər-vər/	दर-वर
3	/d̪ər-kər/	दर-कर
4	/d̪eːʃ - veːʃ/	देश - वेश
5	/d̪əvɑː-t̪əvɑː/	दवा-तवा

6	/d̪əɦɑː - pəɦɑː/	दहा - पहा
7	/d̪əɦiː-vəɦiː/	दही-वही
8	/d̪ɑːɖʰ - vɑːɖʰ/	दाढ - वाढ
9	/d̪ɑːɖ- lɑːɖ/	दाड - लाड
10	/d̪ukʰ - bʰu kʰ/	दुख - भु ख.
11	/d̪əvɑː - kʰəvɑː/	दवा - खवा
12	/d̪ɑːɖiː- sɑːɖiː/	दाडी- साडी
13	/d̪əgəɖiː - pəgəɖiː/	दगडी - पगडी
14	/d̪upɑːriː - supɑːriː/	दुपारी - सुपारी

(viii) Paired Word /d̪ʰ/

Sl.no	IPA	Paired word
1	/d̪ʰər-vər/	धर-वर
2	/d̪ʰəɖeː - vəɖeː/	धडे - वडे
3	/d̪ʰɑːv-bʰɑːv/	धाव-भाव
4	/d̪ʰəɖɑː- vəɖɑː/	धडा- वडा
5	/d̪ʰiːr - viːr/	धीर - वीर
6	/d̪ʰiːr - kʰiːr/	धीर - खीर
7	/d̪ʰoːbiː-goːbiː/	धोबी-गोबी
8	/d̪ʰəɖək-bʰəɖək/	धडक-भडक

(ix) Paired Word /t/

Sl.no	IPA	Paired word
1	/buʈ- suʈ/	बुट- सुट
2	/geːʈ- t̪ʰeːʈ/	गेट- थेट
3	/ʈər - vər/	टर - वर.
4	/ʈeːp - dʒʰeːp/	टेप - झेप
5	/boːʈ - kʰoːʈ/	बोट - खोट
6	/poːʈ - boːʈ/	पोट - बोट
7	/kʰoːʈ - poːʈ/	खोट - पोट
8	/ʈɑːʈɑː - kɑːʈɑː/	टाटा - काटा
9	/ʈɑːl- kʰɑːl/	टाल - खाल
10	/ʈɑːl- kɑːl/	टाल-काल
11	/pɑːʈiː - vɑːʈiː/	पाटी - वाटी
12	/kɑːl - ʈɑːl/	काळ - टाळ
13	/rɔkeːʈ- soːkeːʈ/	रॉकेट- सोकेट
14	/ʈəkəlɑː-vɑːkəlɑː/	टकला-वाकला

(x) Paired Word /tʰ/

Sl.no	IPA	Paired word
1	/ʈʰeːts-veːts/	ठेच -वेच
2	/ʈʰeːts- kʰeːts/	ठेच - खेच
3	/oːʈʰiː- goːʈʰiː/	आठ - गाठ
4	/sɑːʈʰ - ɑːt̪/	साठ - आठ
5	/pɑːʈʰ - gɑːʈʰ/	पाठ - गाठ
6	/t̪ɑːʈʰ- ɑːʈʰ/	ताठ- आठ
7	/t̪ɑːʈʰ- pɑːʈʰ/	ताठ- पाठ
8	/ʈʰəsɑː - gʰəsɑː/	ठसा - घसा

(xi) Paired Word /d/

Sl.no	IPA	Paired word
1	/ɖɑːkuː - vɑːkuː/	डाकू - वाकू
2	/ɖɑːkuː - kɑːkuː/	डाकू - काकू
3	/sɑːɖiː - d̪ɑːɖiː/	साडी - दाडी
4	/ɖukkər - kukkər/	डुक्कर - कुक्कर

(xii) Paired Word /dʰ/

Sl.no	IPA	Paired word
1	/ɖʰɑːl - kɑːl/	ढाल - काल
2	/ɖʰɑːl - sɑːl/	ढाल - साल
3	/kɑːɖʰəliː - vɑːɖʰəliː/	काढली - वाढली
4	/ɖʰoːkəla: - kʰoːkəla:/	ढोकळा - खोकळा

(xiii) Paired Word /tʃ/

Sl.no	IPA	Paired word
1	/tʃəɦɑː -d̪əɦɑː/	चहा -दहा
2	/tʃiːr-kʰiːr/	चीर-खीर
3	/tʃɑːr-kɑːr/	चार-कार
4	/tʃɑːr-vɑːr/	चार-वार
5	/tʃikuː - vikuː/	चिकू - विकू

(xiv) Paired Word /ts/

Sl.no	IPA	Paired word
1	/tsəl-kəl/	चल-कल
2	/kʰeːts - veːts/	खेच - वेच
3	/tsɑːʈ - vɑːʈ/	चाट - वाट

4	/tsɑːk- vɑːk/	चाक-वाक
5	/tsɑːl- pɑːl/	चाल- पाल
6	/tsoːtʃ-ʈoːtʃ/	चोच-टोच

(xv) Paired Word /tʃʰ/

Sl.no	IPA	Paired word
1	/tʃʰət̪ - kʰət̪/	छत - खत
2	/tʃʰəl - dʒəl/	छल - जल
3	/tʃʰəɖiː - vəɖiː/	छडी - वडी
4	/tʃʰɑːp - kɑːp/	छाप - काप
5	/tʃʰɑːp - t̪ɑːp/	छाप - ताप
6	/tʃʰət̪riː - kət̪riː/	छत्री - कत्री
7	/tʃʰoːʈɑː-kʰoːʈɑː/	छोटा-खोटा
8	/tʃʰɑːt̪iː - dʒɑːt̪iː/	छाती - जाती
9	/tʃʰət̪iːs - bət̪t̪iːs	छतीस - बत्तीस

(xvi) Paired Word /dʒ/

Sl.no	IPA	Paired word
1	/dʒəj - bʰəj/	जय - भय
2	/dʒəl - tʃʰəl/	जल-छल

3	/dʒəl-tsəl/	जल - चल
4	/kudʒ - suːdʒ/	कुज - सूज
5	/dʒuɦiː - ruːɦiː/	जुही - रूही
6	/dʒoːɖ - t̪oːɖ/	जोड - तोड
7	/dʒɑːt̪iː- tʃʰɑːt̪iː/	जाती- छाती

(xvii) Paired Word /dʒʰ/

Sl.no	IPA	Paired word
1	/dʒʰəʈ - pəʈ/	झट - पट
2	/dʒʰiʈ - kəʈ/	झट -कट
3	/dʒʰəg - dʒəg/	झग -जग
4	/dʒʰeːp- ʈeːp/	झेप- टेप
5	/dʒʰəreː - kʰəreː/	झरे - खरे
6	/dʒʰɑːɖiː - kʰɑːɖiː/	झाडी - खाडी
7	/dʒʰoːpəliː - ʈoːpəliː/	झोळी- गोळी
8	/dʒʰoːpəliː - ʈoːpəliː/	झोपली - टोपली

(xviii) Paired Word /k/

Sl.no	IPA	Paired word
1	/kəp - dʒəp/	कप - जप
2	/kər - t̪ər/	कर - तर
3	/kər - bʰər/	कर - भर
4	/kɑːr - pʰɑːr/	कार-फार
5	/kɑːr-tʃɑːr/	कार-चार
6	/kɑːr - vɑːr/	कार - वार
7	/tsɑːk - vɑːk/	चाक -वाक
8	/kɑːl - tsɑːl/	काल-चाल
9	/kɑːp - tʃʰɑːp/	काप -छाप
10	/kɑːp - tsɑːp/	काप -चाप
11	/kɑːl- pɑːl/	काल-पाल
12	/kɑːʈɑː - bɑːʈɑː/	काटा - बाटा
13	/ɖɑːkuː - kɑːkuː/	डाकू - काकू
14	/vikuː - tʃikuː/	विकू - चिकू
15	/koːbiː - d̪ʰoːbiː/	कोबी - धोबी
16	/kɑːʈiː-lɑːʈiː/	काटी-लाटी
17	/kɑːʈiː - pɑːʈiː/	काटी - पाटी

18	/kət̪riː - tʃʰət̪riː/	कत्री - छत्री
19	/kɑːkəɖiː - vɑːkəɖiː/	कडाई - लाडाई
20	/pɑːlək - tsɑːlək/	पालक - चालक
21	/kəɖɑːiː - lɑːɖɑːiː/	काकडी - वाकडी

(xix) Paired Word /kʰ/

Sl.no	IPA	Paired word
1	/kʰət̪ - rət̪/	खत-रत
2	/kʰət̪ - tʃʰət̪/	खत-छत
3	/kʰeːts- veːts/	खेच-वेच
4	/kʰuːp - tʃuːp/	खूप-चूप
5	/kʰuːp- d̪ʰuːp/	खूप- धूप
6	/kʰəvɑː d̪əvɑː/	खवा -दवा
7	/kʰoːʈ- poːʈ/	खोट-बोट
8	/kʰoːʈ- boːʈ/	खोट -पोट
9	/kʰiːr-d̪ʰiːr/	खीर-धीर
10	/kʰiːr - tʃiːr/	खीर -चीर
11	/kʰiːr- viːr/	खीर- वीर
12	/kʰoːl-goːl/	खोल-गोल
13	/kʰɑːdʒ- bʰɑːdʒ/	खाज- भाज

14	/kʰɑːɖiː -dʒʰɑːɖiː/	खाडी -झाडी
15	/kʰoːʈɑː- tʃʰoːʈɑː/	खोटा -छोटा

(xx) Paired Word /g/

Sl.no	IPA	Paired word
1	/gɑːl - pɑːl/	गाल - पाल
2	/gɑːʈʰ - pɑːʈʰ/	गाठ - पाठ
3	/gɑːʈʰ - ɑːʈʰ/	गाठ - आठ
4	/gɑːʈʰ - sɑːʈʰ/	गाठ - साठ
5	/gɑːʈʰ - t̪ɑːʈʰ/	गाठ - ताठ
6	/goːl- boːl/	गोल- बोल
7	/gul - d̪ʰul/	गळ - धुळ
8	/goːl - ɖʰoːl/	गोल - ढोल
9	/gəla:- pəla:/	गळा - पळा
10	/gɑːɖiː. d̪ɑːɖiː/	गाडी. दाडी
11	/goːʈʰiː - oːʈʰiː/	गोठी -ओठी
12	/goːli- tsoːli/	गोळी -चोळी
13	/gəppɑː - tʃəppɑː/	गप्पा - चप्पा

(xxi) Paired Word /gʰ/

Sl.no	IPA	Paired word
1	/gʰər- vər/	घर- वर
2	/gʰər - kər/	घर - कर
3	/gʰəɖɑː -vəɖɑː/	घडा -वडा
4	/gʰəɖɑː-pəɖɑː/	घडा-पडा
5	/gʰɑːs - vɑːs/	घास -वास
6	/gʰɑːl- pɑːl/	घाल- पाल
7	/gʰɑːl -tsɑːl/	घाल- चाल
8	/gʰəsɑː - ʈʰəsɑː/	घसा - ठसा

(xxii) Paired Word /s/

Sl.no	IPA	Paired word
1	/sɑːt̪ - vɑːt̪/	सात -वात
2	/sɑːt̪-bʰɑːt̪/	सात-भात
3	/sur -d̪ur/	सुर-दुर
4	/suːdʒ - kuːdʒ/	सूज-कूज
5	/səɦɑː- d̪əɦɑː/	सहा-दहा
6	/səɦɑː - pəɦɑː/	सहा -पहा
7	/sɑːl-d̪ɑːl/	साल-दाल

8	/sɑːʈʰ- ɑːʈʰ/	साठ-आठ
9	/sɑːʈʰ-pɑːʈʰ/	साठ-पाठ
10	/sərpʰ - bərpʰ/	सर्फ- बर्फ
11	/səsɑː-kəsɑː/	ससा-कसा
12	/sɑːɖiː-kʰɑːɖiː/	साडी-खाडी
13	/sɑːɖiː- dʒɑːɖiː/	साडी- जाडी
14	/sɑːɖiː- d̪ɑːɖiː/	साडी- दाडी
15	/supɑːriː- d̪upɑːriː/	सुपारी- दुपारी

(xxiii) Paired Word /ʃ/

Sl.no	IPA	Paired word
1	/veːʃ - reːʃ/	वेश - रेश
2	/ʃiv - dʒiːv/	शिव - जीव
3	/ʃɑːiː- ɑːiː/	शाई- आई
4	/ʃɑːiː- bɑːiː/	शाई- बाई
5	/ʃikʂɑː - rikʂɑː/	शिक्षा - रिक्षा
6	/ʃud̪d̪ʰ- bud̪ʰd̪/	शुद्ध- बुध्द
7	/ʃikət̪ - vikət̪/	शिकत - विकत

4.1 (d) To develop sentences loaded with pressure consonants in Marathi language.

The fourth objective of the study was to develop sentences loaded with pressure consonants in Marathi language. The sentences were prepared using the words loaded with pressure consonants in different positions within the sentences. The prepared sentences were provided to 3 speech language pathologist (SLP) for content validation. 3 SLP's were requested to judge and rate the sentences based on meaningfulness, and familiarity

A total of 178 sentences were prepared, out of which 173 were selected for the final sentence list using pressure consonants within the words in the sentences in Marathi language. The remaining sentences were excluded from the list, as the judges rated them '0', due to their non-meaningfulness and familiarity. The details of the sentences list in across place and manner of articulation is listed below in table 4.31.

Table 4.31

Details of total number of sentences across the different place and manner of articulation for the articulation drill book in Marathi.

Place / Manner	**Bilabial**	**Dental**	**Alveolar**	**Retroflex**	**Palatal**	**Velar**	**Total**
Stops	33	34	-	25	-	33	125
Affricates	-	-	4	-	24	-	28
Fricatives	-	-	10	-	7	-	17
Total	33	34	14	25	31	33	**170**

A total number of 170 sentences were selected, out of which were 125 stops, 28 were affricates, and 17 were fricatives. Further, the category under stops included, in which

(a) 33 were **bialbial.** The details of the sentences considered based on the phoneme for bialbals is given in table 4.32 below.

Table 4.32

Total number of sentences selected for target phoneme for bilabials.

Bilabials	Sentences
/p/	8
/b/	10
/pʰ/	10
/bʰ/	5

b) 34 were **dental.**The details of the sentences considered based on the phoneme for dentals is given in table 4.33. below

Table 4.33

Total number of sentences selected for target phoneme for dentals.

Dentals	Sentences
/t̪/	8
/t̪ʰ/	6
/d̪/	10
/d̪ʰ/	10

(c) 25 were **retroflex.** The details of the sentences considered based on the phoneme for retroflex is given in table 4.34 below.

Table 4.34

Total number of sentences selected for target phoneme for dentals.

Dentals	Sentences
/t̪/	8
/t̪ʰ/	6
/d̪/	10
/d̪ʰ/	10

(d) 33 **were velar.** The details of the sentences considered based on the phoneme for velar is given in table 4.35 below.

Table 4.35

Total number of sentences selected for target phoneme for velar..

Velar	Sentences
/k/	14
/kʰ/	7
/g/	7
/gʰ/	5

Further, the category under affricates included

(a) 6 were **alveolar**. The details of the sentences considered based on the phoneme for alveolar is given in table 4.36 below.

Table 4.36

Total number of sentences selected for target phoneme for alveolar.

Alveolar	Paired word
/ts/	6

(b) 24 were **Palatal**. The details of the sentences considered based on the phoneme for palatal is given in table 4.37 below.

Table 4.37

Total number of sentences selected for target phoneme for palatal.

Palatal	Sentence
/tʃ/	5
/tʃʰ/	6
/dʒ/	10
/dʒʰ/	3

Further, the category under fricatives includes,

(a) 10 were **alveolar**.The details of the sentences considered based on the phoneme for alveolar is given in table 4.38 below.

Table 4.38

Total number of sentences selected for target phoneme for alveolar.

Alveolar	Sentence
/s/	10

(b) 7 were **palatal.** The details of the sentences considered based on the phoneme for palatal is given in table 4.39 below.

Table 4.39

Total number of sentences selected for target phoneme for palatal.

Palatal	Sentence
/ʃ/	7

The detailed word list for paired word is given in Table 4.40.

Table 4.40.

Sentence list.

(i) /p/

Sl no	IPA	Sentences
1	/pərul pəriː ɑːɦeː/	परुल परी आहे
2	/puːdʒɑː upəvɑːsə kərət̪eː/	पूजा उपवास करते
3	/pɑːrul puːdʒɑː kərət̪eː/	पारुल पूजा करते
4	/pərəd̪ɑː pivəla ɑːɦeː/	परदा पिवळा आहे
5	/kəpəɖɑː pivəla ɑːɦeː/	कपडा पिवळा आहे
6	/pəpɑːiː pikəleːliː ɑːɦeː/	पपाई पिकलेली आहे
7	/d̪ipəkəlɑː paːiseː pɑːɦidʒeː/	दिपकला पैसे पाहिजे
8	/pɑːɳiː pjɑːjəlɑː kʰuːpə gərd̪iː ɦoːt̪iː/	पाणी प्यायला खूप गर्दी होती

(ii) /b/

Sl no	IPA	Sentences
1	/boːkɑː gʰɑːbərəlɑː/	बोका घाबरला
2	/baːil bəsəlɑː ɑːɦeː/	बैल बसला आहे
3	/bxg gɑːjəbə dʒʰɑːliː/	बॅग गायब झाली
4	/bɑːiː biskiːʈ kʰɑːt̪eː/	बाई बिस्कीट खाते
5	/boːbi bxg bɑːgeːt̪ə ʈʰeːvət̪oː/	बोबि बॅग बागेत ठेवतो
6	/bɑːjəkoː bɑːɦeːr bɑːgeːt̪ ɑːɦeː/	बायको बाहेर बागेत आहे
7	/bəs bəsʈɔpəvərə ubʰiː ɑːɦeː/	बस बसस्टॉपवर उभी आहे
8	/bɑːʈəliː bəbit̪ɑːtʃjɑː bɑːgeːt̪ ɑːɦeː/	बाटली बबिताच्या बागेत आहे
9	/t̪iː bɑːdʒɑːrɑːt̪ bəbit̪ɑːʃiː boːlət̪ dʒɑːt̪ ɑːɦeː/	ती बाजारात बबिता शी बोलत जात आहे
10	/bəbəliː bəriːts bɑːriːkə dʒʰɑːliː ɑːɦeː/	बबली बरीच बारीक झाली आहे

(iii) /pʰ/

Sl no	IPA	Sentences
1	/pʰugɑː pʰuʈəlɑː/	फुगा फुटला
2	/pʰɑːiːl pʰɑːʈəliː/	फाईल फाटली
3	/pʰərəʃiː sɑːpʰə ɑːɦeː/	फरशी साफ आहे
4	/pʰəlaː sɑːpʰə ɑːɦeː/	फळा साफ आहे

5	/pʰuːlə svəst̪ə ɑːɦeː/	फूल स्वस्त आहे
6	/tsɑːpʰɑː pʰuːl ɑːɦeː/	चाफा फूल आहे
7	/kɔpʰiː pʰukəʈ ɑːɦeː/	कॉफी फुकट आहे
8	/soːpʰɑː pʰɑːr svəst̪ə ɑːɦeː/	सोफा फार स्वस्त आहे
9	/pʰuləpɑːkʰəruː pʰulɑːvərt̪iː bəsət̪oː/	फुलपाखरू फुलावरती बसतो
10	/pʰɑːruːkəlɑː siːt̪ɑːpʰəl və keːliː pʰɑːr ɑːvəɖət̪eː/	फारूकला सीताफळ व केळी फार आवडते

(iv) /bʰ/

Sl no	IPA	Sentences
1	/bʰɑːkəriː bʰɑːdʒliː/	भाकरी भाजली
2	/bʰiːruː bʰɑːrət̪iːjə ɑːɦeː/	भीरू भारतीय आहे
3	/bʰikɑːriː bʰik gʰeːt̪oː/	भिकारी भिक घेतो
4	/bʰiruːlɑː bʰərpuːrə əbʰjɑːs ɑːɦeː/	भिरूला भरपूर अभ्यास आहे
5	/bʰɑːdʒiː bʰɑːkəriː soːbət̪ bʰɑːriː lɑːgət̪eː/	भाजी भाकरी सोबत भारी लागते

(v) /t̪/

Sl no	IPA	Sentences
1	/t̪iː t̪əjɑːr ɑːɦeː/	ती तयार आहे
2	/t̪ɑːiː t̪əjɑːr dʒʰɑːliː/	ताई तयार झाली

3	/t̪ivɑːriː tʃət̪ur ɑːɦeː/	तिवारी चतुर आहे
4	/kəvit̪ɑː tʃət̪ur ɑːɦeː/	कविता चतुर आहे
5	/t̪ɑːʈ t̪ɑːpəleːlɑː ɑːɦeː/	ताट तापलेला आहे
6	/sɑːɦit̪jə t̪ikəʈ ɑːɦeː/	साहित्य तिकट आहे
7	/t̪udʒʰeː vəst̪uː pərət̪ kər/	तुझे वस्तू परत कर
8	/t̪iː dʒɑːst̪ t̪əjɑːr dʒʰɑːliː ɑːɦeː/	ती जास्त तयार झाली आहे

(vi) /t̪ʰ/

Sl no	IPA	Sentences
1	/t̪ʰeːʈə tʃɑːlə/	थेट चाल
2	/t̪it̪ʰeː bəs/	तिथे बस
3	/t̪it̪ʰeː dʒɑː/	तिथे जा
4	/pɑːrt̪ʰ t̪iːt̪ʰeː ɑːɦeː/	पार्थ तिथे आहे
5	/t̪ʰaːiliː pʰɑːr sɑːɦit̪j ɑːɦeːt̪/	थैली फार साहित्य आहेत
6	/t̪it̪ʰeː t̪ʰeːʈə geːloː kiː t̪ʰeːʈər ɑːɦeː/	तिथे थेट गेलो की थेटर आहे

(vii) /d̪/

Sl no	IPA	Sentences
1	/pərd̪ɑː səpʰeːd̪ ɑːɦeː/	पर्दा सफेद आहे
2	/d̪ɑːd̪ɑː d̪əɦɑːviːt̪ ɑːɦeː/	दादा दहावीत आहे

3	/d̪əjaːlaː sərd̪iː dʒʰaːliː/	दयाला सर्दी झाली
4	/prəsaːd̪ d̪eːvəgʰəraːt̪ aːɦeː/	प्रसाद देवघरात आहे
5	/t̪ilaː d̪əɦaː d̪aːt̪ aːɦeːt̪/	तिला दहा दात आहेत
6	/d̪ivaːliː laː d̪ivaː laːvət̪aːt̪/	दिवाळी ला दिवा लावतात
7	/d̪ijaː kəɖeː d̪əɦaː tʃaːd̪ərə aːɦeː/	दिया कडे दहा चादर आहे
8	/dʒaːd̪uːgaːr dʒaːd̪uː kərət̪ aːɦeː/	जादूगार जादू करत आहे
9	/t̪udʒʰjaː d̪aːraːtʃjaː baːdʒuːlaː d̪usəraː d̪aːr aːɦeː/	तुझ्या दाराच्या बाजूला दुसरा दार आहे
10	/d̪ijaː tʃeː d̪ivəsəbʰər d̪əjaː soːbət̪ vaːd̪ vivaːd̪ dʒʰaːleː/	दिया चे दिवसभर दया सोबत वाद विवाद झाले

(viii) /d̪ʰ/

Sl no	**IPA**	**Sentences**
1	/d̪ʰiːrə d̪ʰərə/	धीर धर
2	/bud̪d̪ʰə vid̪ʰaːt̪aː aːɦeː/	बुद्ध विधाता आहे
3	/raːd̪ʰaː d̪ʰaːɖəsiː aːɦeː/	राधा धाडसी आहे
4	/d̪ʰoːbiː d̪ʰoːt̪ər d̪ʰut̪ə aːɦeː/	धोबी धोतर धुत आहे
5	/vid̪jaːrt̪ʰi spərd̪ʰeːt̪ə bʰaːg gʰeːt̪aːt̪ə/	विद्यार्थि स्पर्धेत भाग घेतात
6	/raːd̪ʰikaː kəɖeː əd̪ʰik paːisaː aːɦeː/	राधिका कडे अधिक पैसा आहे

7	/rɑːd̪ʰɑː d̪ʰiːrədʒ vər kroːd̪ʰit̪ə dʒʰɑːliː/	राधा धीरज वर क्रोधित झाली
8	/səgəle d̪ʰɑːvəpəʈuː spərd̪ʰeːt̪ bʰɑːg gʰeːt̪ɑːt̪/	सगळे धावपटू स्पर्धेत भाग घेतात
9	/rɑːd̪ʰikɑː d̪ərəvɑːdʒjɑːlɑː d̪ʰəɖəkəliː/	राधिका दरवाज्याला धडकली
10	/d̪ʰəvəl bud̪ʰəvɑːriː vivəd̪ʰ prəkɑːrətʃeː d̪ʰoːt̪iː ʃoːd̪ʰət̪ ɦoːt̪ɑː/	धवल बुधवारी विवध प्रकारचे धोती शोधत होता

(ix) /t/

Sl no	**IPA**	**Sentences**
1	/ʈəkɑːʈək ɑːɦeː/	टकाटक आहे
2	/ ʈoːpiː ulʈiː kərə/	टोपी उलटी कर
3	/ʈipuː ʈəklɑː ɑːɦeː/	टिपू टकला आहे
4	/sveːʈər uləʈ gʰɑːt̪əleː/	स्वेटर उलट घातले
5	/ʈipuː ʈoːpiː gʰɑːt̪əliː/	टिपू टोपी घातली
6	/ʈipuː ʈirɑːlɑː ʈɑːliː d̪eːt̪oː/	टिपू टिराला टाळी देतो
7	/ʈirɑː ʈikəliː lɑːvət̪eː/	टिरा टिकली लावते

(x) /tʰ/

Sl no	IPA	Sentences
1	/dʒʰɑːɖeː tʃʰoːʈiː ɑːɦeːt̪/	झाडे छोटी आहेत
2	/ʈʰɑːkuːrə d̪ʰi ʈʰə ɑːɦeː/	ठाकूर धिठ आहे
3	/ɦɑː ɑːʈʰəvəɖɑː veːgəla ɑːɦeː/	हा आठवडा वेगळा आहे
4	/svət̪hsɑːʈʰiː bəsɑːjəlɑː pɑːʈʰ gʰeː/	स्वतःसाठी बसायला पाठ घे

(xi) /d/

Sl no	IPA	Sentences
1	/lɑːɖuː goːɖ ɑːɦeː/	लाडू गोड आहे
2	/d̪ʰəɖeː əvəgʰəɖ ɑːɦeː/	धडे अवघड आहे
3	/reːɖioː kʰɑːliː pəɖəlɑː/	रेडिओ खाली पडला
4	/ɖɔliː iɖəliː kʰɑːt̪eː/	डॉली इडली खाते
5	/ɖɔliː ɖoːsɑː və iɖəliː kʰɑːt̪eː/	डॉली डोसा व इडली खाते
6	/ɖiːnɑː ɖəpʰəliː vɑːdʒəvət̪eː/	डीना डफली वाजवते

(xii) /dʰ/

Sl no	IPA	Sentences
1	/puɖʰeː tsələ/	पुढे चल
2	/t̪oː gɑːɖʰəv ɑːɦeː/	तो गाढव आहे
3	/keːvəɖʰɑː ɦɑː kətsərɑː/	केवढा हा कचरा
4	/t̪iː pəl kɑːɖʰət̪eː/	ती पळ काढते
5	/vɑːsəruː oːɖʰələ pʰirət̪ɑːt̪/	वासरू ओढल फिरतात
6	/ɖʰoːkəla: pʰɑːrə tsəuː ɑːɦeː/	ढोकळा फार चऊ आहे
7	/t̪ineː pɑːjɑːtʃeː ʈʰəseː kɑːɖʰəleː/	तिने पायाचे ठसे काढले
8	/t̪oː svət̪h tʃɑː gʰərɑːtʃɑː tʃit̪rə kɑːɖʰət̪oː/	तो स्वतः चा घराचा चित्र काढतो

(xiii)/tʃ/

Sl no	IPA	Sentences
1	/tʃəɦɑː gɑːr ɑːɦeː/	चहा गार आहे
2	/tʃɑːtʃiː tʃɑːlək ɑːɦeː/	चाची चालक आहे
3	/tʃɑːjɑː d̪ərəvɑːdʒɑː kʰoːl/	चाया दरवाजा खोल
4	/tʃʰɑːjɑːlɑː tʃəkkər ɑːliː/	छायाला चक्कर आली
5	/t̪itʃjɑːkəɖeː tʃɑːrə tʃɑːd̪ər ɑːɦeːt̪/	तिच्याकडे चार चादर आहेत

(xiv) /ts/

Sl no	IPA	Sentences
1	/tsaːupɑːʈiː tsɑːluː ɑːɦeː/	चौपाटी चालू आहे
2	/tsoːr tʃət̪urə və tʃɑːlɑːk ɑːɦeː/	चोर चतुर व चालाक आहे
3	/kʰuːpə kətsərɑː dʒʰɑːlɑː ɑːɦeː/	खूप कचरा झाला आहे
4	/t̪jɑː tʃɑː jɑː svəbʰɑːvɑːtʃiː tsərtʃɑː bʰərəpuːr dʒʰɑːliː/	त्याचा या स्वभावाची चर्चा भरपूर झाली

(xv) /tʃʰ/

Sl no	IPA	Sentences
1	/ tʃʰəviː pust̪ək tʃʰɑːpət̪eː/	छवी पुस्तक छापते
2	/ tʃʰəviː kəɖeː tʃʰoːʈiː tʃʰət̪riː ɑːɦeː/	छवी कडे छोटी छत्री आहे
3	/ tʃʰɑːjɑː tʃeː gʰər kʰuːp svə tʃtʃʰə ɑːɦeː/	छायाचे घर खूप स्वच्छ आहे
4	/svətʃtʃʰət̪ɑː pɑːlaː roːgərɑːiː ʈɑːlaː/	स्वच्छता पाळा रोगराई टाळा
5	/tʃʰɑːjɑː kəɖeː tʃʰət̪iːs tʃʰət̪rjɑː ɑːɦeːt̪/	छाया कडे छतीस छत्र्या आहेत
6	/dʒit̪ʰeː svətʃtʃʰət̪ɑː əseː t̪it̪ʰeː ɑːroːgjə əseː/	जिथे स्वच्छता असे तिथे आरोग्य असे

(xviii) /dʒ/

Sl no	IPA	Sentences
1	/dʒəjɑː dʒeːvət̪ ɦoːt̪iː/	जया जेवत होती
2	/dʒɑːd̪uːgər dʒɑːd̪uː kərət̪oː/	जादूगर जादू करतो
3	/dʒəgəd̪iːʃ dʒəjəpur lɑː geːlɑː/	जगदीश जयपुरला गेला
4	/rɑːdʒɑːlɑː vidʒəjə prɑːpt̪ə dʒʰɑːleː/	राजाला विजय प्राप्त झाले
5	/suːrədʒ dʒoːrɑːt̪ bɑːdʒɑː vɑːdʒəvət̪oː/	सूरज जोरात बाजा वाजवतो
6	/dʒəjətʃiː dʒoːɖiː dʒəbɑːbəd̪ɑːr ɑːɦeː/	जयची जोडी जबाबदार आहे
7	/rɑːdʒeːʃə tʃɑː ɑːvɑːdʒ pʰɑːrə goːɖ ɑːɦeː/	राजेशचा आवाज फार गोड आहे
8	/surədʒ ɑːdʒə və ud̪jɑː bɑːdʒɑːrɑːt̪ dʒɑːil/	सुरज आज व उद्या बाजारात जाइल
9	/səgəljɑː gɑːvɑːt̪ t̪jɑːtʃjɑː jɑː svəbʰɑːvɑːtʃiː tʃərtʃɑː dʒʰɑːliː/	सगळ्या गावात त्याच्या या स्वभावाची चर्चा झाली
10	/gudʒərɑːt̪iː loːkə səgəljɑːt̪ dʒɑːst̪ gudʒərɑːt̪əlɑː rɑːɦət̪ɑːt̪/	गुजराती लोक सगळ्यात जास्त गुजरातला राहतात

(xvii) /dʒʰ/

Sl no	IPA	Sentences
1	/t̪iː dʒʰoːpəliː/	ती झोपली
2	/dʒʰoːpəɖiː kuʈʰeː ɑːɦeː/	झोपडी कुठे आहे
3	/t̪itʃjɑː gʰərɑːt̪ə dʒʰɑːlər ɑːɦeː/	तिच्या घरात झालर आहे

(xviii) /k/

Sl no	IPA	Sentences
1	/kətsərɑː kuʈʰeː ɑːɦeː/	कचरा कुठे आहे
2	/kɑːgəd̪ə kʰəɖək ɑːɦeː/	कागद खडक आहे
3	/koːjəl kuku kərət̪eː/	कोयल कुकु करते
4	/kəvit̪ɑː ʈoːkəriː gʰeː/	कविता टोकरी घे
5	/kɑːvəlaː kɑːlaː ɑːɦeː/	कावळा काळा आहे
6	/kəd̪ʰiː kəɖəvəʈ ɑːɦeː/	कडी कडवट आहे
7	/kəvit̪ɑː kɔleːdʒlɑː dʒɑːt̪eː/	कविता कॉलेजला जाते
8	/kəvit̪ɑː pust̪ək vɑːtsət̪eː/	कविता पुस्तक वाचते
9	/bɑːjəkoː kʰuːp kəʂʈə kərət̪eː/	बायको खूप कष्ट करते
10	/bɑːjəkoː gɑːvɑːlɑː geːliː/	बायको गावाला गेली
11	/kəvit̪ɑː bɑːɦeːr rɑːɦət̪eː/	कविता बाहेर राहते
12	/kəvit̪ɑːlɑː tʃəkkərə ɑːliː/	कविताला चक्कर आली
13	/kɑːveːriː kətsərɑː eːkədʒuːʈ kər/	कावेरी कचरा एकजूट कर
14	/kɑːveːriːlɑː pʰrɔkə gʰɑːlɑːj tʃiː ɑːvəɖ ɑːɦeː/	कावेरीला फ्रॉक घालायची आवड आहे

(xix) /kʰ/

Sl no	IPA	Sentences
1	/t̪i: kʰo:kəlɑ:t̪ ɦo:t̪i:/	ती खोकलात होती
2	/tʃʰɑ:jɑ: rɑ:kʰi: d̪ɑ:kʰəv/	छाया राखी दाखव
3	/sɑ:kʰər kʰu:pə go:ɖ ɑ:ɦe:/	साखर खूप गोड आहे
4	/po:ʃɑ:kʰ kʰu:p kʰərɑ:b ɑ:ɦe:/	पोशाख खूप खराब आहे
5	/t̪i: kʰərəts kʰu:p kʰuʃ ɦo:t̪i:/	ती खरच खूप खुश होती
6	/ɑ:i: kʰɑ:jəlɑ: kʰitsəɖi: kərət̪e:/	आई खायला खिचडी करते
7	/ut̪ʰe: kʰu:p sɑ:re: pʰulpɑ:kʰəru: ɑ:ɦe:t̪ə/	उथे खूप सारे फुलपाखरू आहेत

(xx) /g/

Sl no	IPA	Sentences
1	/t̪o: gəlli:t̪ə rɑ:ɦət̪o:/	तो गल्लीत राहतो
2	/gi:t̪ɑ: go:vjɑ:lɑ: ge:li:/	गीता गोव्याला गेली
3	/gi:t̪ɑ: kʰu:pə gəppɑ: kərət̪e:/	गीता खूप गप्पा करते
4	/gi:t̪ɑ:tʃe: gɑ:v go:vɑ: ɑ:ɦe:/	गीताचे गाव गोवा आहे
5	/bərpʰɑ:tsɑ: go:la go:ɖ ɑ:ɦe:/	बर्फाचा गोळा गोड आहे
6	/gi:t̪ɑ:ne: gɑ:jəlɑ: kʰɑ:jəlɑ: gʰɑ:t̪əle:/	गीताने गायला खायला घातले

7	/bʰuːgoːlə ɦɑː gɑːjət̪̺riː tʃɑː ɑːvəɖət̪̺ɑː viʂəjə ɑːɦeː/	भूगोल हा गायत्रीचा आवडता विषय आहे

(xxi) /gʰ/

Sl no	IPA	Sentences
1	/rɑːgʰəv gʰəriː geːlɑː/	राघव घरी गेला
2	/pəkʂiː gʰərəʈjɑːt̪̺ rɑːɦət̪̺eː/	पक्षी घरट्यात राहते
3	/peːpər kʰuːp əvəgʰəɖ ɦoːt̪̺eː/	पेपर खूप अवघड होते
4	/rɑːgʰəv tʃɑː gʰəsɑː d̪̺ukʰət̪̺ə ɑːɦeː/	राघवचा घसा दुखत आहे
5	/rɑːgʰəvəlɑː peːpər əvəgʰəɖə geːlɑː/	राघवला पेपर अवघड गेला

(xxii) /s/

Sl no	IPA	Sentences
1	/siːt̪̺ɑː tʃiː sɑːɖiː səpʰeːd̪̺ə ɑːɦeː/	सीताची साडी सफेद आहे
2	/sipɑːɦiː sɑːjəkələ tsɑːləvət̪̺oː/	सिपाही सायकल चालवतो
3	/t̪̺iːlɑː ləssiː kʰuːp ɑːvəɖət̪̺eː/	तिला लस्सी खूप आवडते
4	/sɑːɦil ɑːɳi sɑːɦiliː sərkəs lɑː geːleː/	साहिल व साहिली सर्कसला गेले
5	/t̪̺itʃjɑːkəɖeː səɦɑː rupəjeː ɑːɦeːt̪̺/	तिच्याकडे सहा रुपये आहेत
6	/siːt̪̺ɑː soːpjɑː vərət̪̺iː bəsət̪̺ ɑːɦeː/	सीता सोप्या वरती बसत आहे
7	/sɑːɦil kʰuːp bəɦɑːd̪̺ur və sɑːɦəsiː ɑːɦeː/	साहिल खूप बहादुर व साहसी आहे

8	/siːt̪ɑːlɑː rəsəgulljɑːtʃiː rəs kʰuːpə ɑːvəɖət̪oː/	सीताला रसगुल्ल्याची रस खूप आवडतो
9	/səmiːr soːlɑːpuːrlɑː sɑːjəkələ vər gela:/	समीर सोलापूरला सायकल वर सकाळी गेला
10	/səmiːr dʒəmiːn sərpʰə neː sɑːpʰə kərət̪oː/	समीर सहा वाजता रोज सायकल चालवायला जातो

(xxiii) /ʃ/

Sl no	IPA	Sentences
1	/ʃəʃiː ʃəpət̪ʰ gʰeːt̪oː/	शशी शपथ घेतो
2	/ʃeːt̪əkəriː ʃeːt̪iː kərət̪oː/	शेतकरी शेती करतो
3	/ʃikʂəkə ʃɑːlet̪ə ʃikəvət̪oː/	शिक्षक शाळेत शिकवतो
4	/ʃiːlɑː pʰərəʃiː sɑːpʰə kərət̪eː/	शीला फरशी साफ करते
5	/ʃəʃiː ʃiɖiːvərə bəsəliː ɦoːt̪iː/	शशी शिडीवर बसली होती
6	/ʃiːlɑː tʃiː piʃəviː səɦɑːʃeː rupəjɑːtʃiː ɑːɦeː/	शीलाची पिशवी सहाशे रुपयाची आहे
7	/ʃɑːlet̪ə ʃikʂəkə t̪jɑːlɑː ʃɑːbɑːsəkiː d̪iliː/	शाळेत शिक्षक त्याला शाबासकी दिली

4.1 (e) To obtain feedback of the developed stimuli by native speaker of Marathi Speech language pathologist.

As part of the last objective of the study, 3 speech language pathologist (SLP) were requested to judge the content for words, paired words, sentences, and picture using 3 point rating scale. The judges (SLP's) considered in the present study were native speakers of Marathi with a minimum of three years clinical experience in communication disorders. For overall judgement of the articulation drill bool in Marathi, the judges were requested to rate the material. For this, scale of *“Feedback questionnaire for aphasia treatment manual”* (Goswami et al, 2010) was used. This scale, is listed in Appendix 1.

Based on the overall rating scale, the overall articulation drill book in Marathi language, was rated as ‘appropriate’, based on the following parameters, : a) simplicity, (b) proverbility, (c) accessible, (d) complexity, (e) trainability, (f) stimulability, (g) size of the picture, (h) color and appearance, (i) feasibility, and (j) scoring pattern.

CHAPTER V

SUMMARY AND CONCLUSION

Cleft lip and/or palate (CLP) is a congenital condition in which the tissue that forms the upper lip and/or palate fail to align properly during the initial stages of gestation and leave a fissure on the upper lip and/or the palate. CLP is a globally attested condition with a worldwide frequency of 1 in 700 live births (Mossey et al., 2009). In India the number of infants born every year with CLP is 28,600 with mean 78 affected infants are born every day, or 3 infants with CLP born every hour (Mossey & Little, 2009).

Individuals with CLP have several associated problems which includes defective nasolabial region, impaired bone structure, difficulty in swallowing, hearing impairment, dental malocclusion, delayed development, and delayed social growth. These associated problem in individual with CLP requires them to undergo early rehabilitation. Apart from these children with CLP have speech and language impairment. CLP leads to impaired articulation and resonance, which leads to a significant unintelligible speech. Further, children with CLP mainly exhibit articulatory errors in pressure consonants, which includes substitution, omissions, distortion, and additions, out of which substitution more often leads to compensatory articulation. The presence of the articulatory errors calls attention for articulation therapy. Among the various procedure followed to accomplish articulation therapy, the most effective and efficient procedure is articulation drill.

An articulation drill book will lighten the task of speech language pathologists (SLP), who frequently need to spend considerable time developing word list and organizing speech materials, from many diverse sources. Articulation drill material comprises of syllables, word at different position, 2-3 word phrases, and grammatically complete sentences making it accessible for the SLP's. Moreover, articulatory drill material also produces effective results over a relatively short period of time. Articulation drill material is an efficient method used to target at the syllable, words, sentence, and discourse level.

There are several articulation drill materials in different languages to provide articulation therapy. In Indian context, articulation drill book for individual with CLP has been developed as a part of dissertation. Articulation drill material is available in Telugu (Hemalatha, 2011), Kannada (Prasad, 2011), Malayalam (Weshley, 2011), and Hindi (Barkha, 2012) language. Among the various languages spoken in subcontinent of India, Marathi is widely spoken in the state of Maharashtra. In the state of Maharashtra, there are approximately 13 hospital which provide free CLP surgery. Without standard, readily available material it is difficult to document the effect of surgery in the improvement of articulation in children with CLP. Also, the resource material is limited in the area of management for children with CLP. In view of this, present study was to develop articulation drill material for individual with CLP in Marathi language, with the following objectives:

(a) To identify the pressure consonants in Marathi language.

(b) To compile the wordlist and picture stimuli (meaningful words) loaded with pressure consonants in initial, medial, and final position in Marathi language.

(c) To compile paired words loaded with pressure consonants in Marathi language.

(d) To develop sentences loaded with pressure consonants in Marathi language.

(e) To obtain feedback of the developed stimuli by native speaker of Marathi SLP's

Preparation of the articulation drill material: The drill material was developed into 3 phases.

5.1 (i). Identification of pressure consonants in Marathi language was carried out. A total of 16 stops, 5 affricates, and 2 fricatives, were considered in the present study based on phonology of Marathi (Berkson et al., 2017).

5.2 (ii). The second phase consisted of four stages:

(I) Compilation of words loaded with pressure consonants in three different positions.

The picturable word list and non-picturable word list using pressure consonant in three different positions was identified. The words were identified from various available resources. The identified, and shortlisted words were then, classified as picturable words and non picturable word based on the vocabulary of the children above 3 years of age, frequency of occurrence, simplicity and meaningfulness of words. The list consisted of both picturable and non picturable word list in initial, medial and final position excluding nasal consonants.

(II) Compilation of paired words loaded with pressure consonants.

A set of paired words loaded with pressure consonants were identified and compiled. The paired words were prepared by changing the consonants and the same vowel or by different vowel and same consonants. Paired words were considered as this aid in discrimination training which is an important stage of articulation therapy.

(III) Development of sentences loaded with pressure consonants.

As generalization is an important stage in articulation therapy, sentences were prepared. Care was taken to use the same pressure consonants in different positions within the sentences. Sentences were prepared based on the frequency, meaningfulness, length of the words in the Marathi language excluding nasal consonants.

(IV) Selection of pictures for words in three positions.

As stimulability in terms of auditory, visual, or tactile cues in order to enhance learning is important, picture stimuli was prepared. Pictures for the target words were selected from the google images. For each word three colorful and unambiguous pictures were selected. The pictures were selected by the investigator for each target sound appropriately represents the word.

5.1 (iii). The third phase addresses objective (e), where the content validation of the drill book has been carried out.

For content validation, 3 SLP's were requested to rate the words (picturable and non-picturable) list, paired words and sentences based on the 3 point rating scale which consist of following parameters, (a) non-picturability, (b) meaningfulness, (c) familiarity, and (d) frequency of occurrence in the language. The judges (SLP's) considered in the present study were native speakers of Marathi with a minimum of three years clinical experience in communication disorders.

Finally, the judges were requested to rate the overall articulation drill book in Marathi, using the scale of "Feedback questionnaire for aphasia treatment manual" (Goswami et al., 2010) listed in Appendix 1. Based on this, the feedback was obtained and analysis was carried out. In instances where two judges had an agreement of rating of the words, paired words, sentences, and picturable words as '2' and '1', they were considered in the final list. Instances where two judges were not in agreement or rated the stimuli as '0' was excluded from the list.

Based on all the above feedback the articulation drill book was developed and consists of four sections.

Section I: Word list

Section II: Pair words

Section III: Sentences

Section IV: Picturable words.

In section I, word list (non-picturable) was compiled in initial, medial and final position for each target speech sounds in Marathi and IPA except for the /tʰ/, /tʃ/in final position, /d/ and /dʰ/ in initial position as they were picturable. Number of words in each position is varied, depending on the frequency of the occurrence of the speech sound. The word final list is in table 1 (results)

In section II, Pair word were provided in Marathi and IPA for all speech sounds .The paired word list were prepared by differing the consonant with same vowel. The number of pair word list is varied for all speech sounds. The number of paired words were depend on frequency of occurrence of the speech sound. The final paired words list is in table (result).

In section III, The sentence list was prepared for each target sound. Some of the sentences are not grammatically correct which were marked in (*) mark. The final sentences list is in table (result)

In section IV, the picturable word list was compiled in initial, medial and final position for each target speech sounds in Marathi and IPA , except /tʰ/ in initial, and medial position, /tʃʰ/, and /dʒʰ/ in medial and final position, and /kʰ/ in final position as they were non picturable. The number of picture words for each target sound varied according to the frequency of occurrence. The final picturable word list is in table (results) and picture stimuli is in Appendix-2.

The compiled number of stimuli for all sections mention above is given in table 5.1.

Table 5.1

Compiled table of number of stimuli for all sections.

Note: TP – Target phoneme, PW- Paired words, St – Sentences, T- Total.

Sl no	**T P**	**PW**	**Words (non-picturable)**			**Words (picturable)**			**St.**	**T**
			I	**M**	**F**	**I**	**M**	**F**		
1	/p/	11	15	21	15	32	16	5	8	123
2	/b/	11	20	17	5	17	16	1	10	97
3	/pʰ/	5	13	10	2	9	6	3	10	58
4	/bʰ/	11	20	10	3	6	3	2	5	60
5	/t̪/	14	20	25	26	7	16	9	8	125
6	/t̪ʰ/	10	13	6	2	3	1	2	6	43
7	/d̪/	14	19	24	6	17	12	3	10	105
8	/d̪ʰ/	8	14	8	5	3	3	2	10	53
9	/t/	14	11	8	14	8	17	11	7	90
10	/tʰ/	8	4	3	-	-	-	3	4	22
11	/d/	4	-	17	7	5	19	3	6	61
12	/dʰ/	4	-	6	2	1	2	1	8	24
13	/tʃ/	5	6	8	-	7	2	3	5	36

14	/ts/	6	5	5	6	5	2	2	4	35
15	/tʃʰ/	9	3	1	2	6	-	-	6	27
16	/dʒ/	7	14	13	6	9	13	1	10	73
17	/dʒʰ/	8	12	3	-	9	-	-	3	35
18	/k/	21	19	32	10	22	21	13	14	152
19	/kʰ/	15	11	7	4	7	3	-	7	54
20	/g/	13	10	9	10	14	14	4	7	81
21	/gʰ/	8	7	4	1	4	2	1	5	32
22	/s/	15	13	14	9	16	12	7	10	96
23	/ʃ/	7	14	8	4	7	5	-	7	52
	Total	**228**	**263**	**259**	**139**	**217**	**185**	**76**	**170**	**1537**

Advantages:

1. Material helps in providing quicker results by focusing on improvement of child’s Articulation
2. Maximizes the amount of trials during a speech therapy homework session.
3. Prescribes drills based on where the child is breaking down in the speech sound continuum so as to deliver the most effective drills offering the greatest gains.
4. Empowers individuals to make a difference in their child's speech development.
5. Believes the parent/caregiver can develop the skills necessary to make a profound

difference at home by providing highly effective speech drill work.

Clinical Implication:

1. It can be used for articulation therapy for clients with cleft lip and palate.
2. It can be provided to parents for home training.
3. This helps in achieving generalization from isolation to words and sentences.
4. It helps clinician to monitor progress of the child’s articulation after therapy.

Limitations:

1. Drill material is not divided based on the age level of the client.
2. Drill material is not classified based on parts of speech: noun, verb, adjective and adverb.
3. Drill material is primarily focused on providing the drill material, not emphasizing on method of elicitation of speech sound errors.

References

Albustanji, Y. M., Albustanji, M. M., Hegazi, M. M., & Amayreh, M. M. (2014). Prevalence and types of articulation errors in Saudi Arabic-speaking children with repaired cleft lip and palate. *International Journal of Pediatric Otorhinolaryngology*, *78*(10), 1707-1715.

Barkha (2012). Development of articulation drill book for cleft palate population in Hindi. *Student research at AIISH* (Articles based on dissertation done at AIISH). All India Institute of Speech and Hearing, Manasagangothri, Mysore.

Berkson, K. H., & Nelson, M. (2017). Phonotactic frequencies in Marathi. *IULC Working Papers*, *17*(1).

Byrne, M. C., Shelton Jr, R. L., & Diedrich, W. M. (1961). Articulatory skill, physical management, and classification of children with cleft palates. *Journal of Speech and Hearing Disorders*, *26*(4), 326-333. https://doi.org/10.1044/jshd.2604.326

Bzoch, K. R. (1965). Articulation proficiency and error patterns of preschool cleft palate and normal children. *The Cleft Palate Journal*, *2*(4), 340-349.

Bzoch, K. R. (1979). Etiological factors related to cleft palate speech. *Communicative disorders related to cleft lip and palate. Boston: Little Brown & Company*, 67-77.

Bzoch, K. R. (Ed.). (1997). *Communicative disorders related to cleft lip and palate* (pp. 261-311). Austin: Pro-ed.

Chapman, K. L. (1991). Vocalizations of toddlers with cleft lip and palate. *The Cleft Palate-Craniofacial Journal*, *28*(2), 172-178. https://doi.org/10.1597/1545-1569_1991_028_0172_votwcl_2.3.co_2

Chapman, K. L., Hardin-Jones, M., & Halter, K. A. (2003). The relationship between early speech and later speech and language performance for children with cleft lip and palate. *Clinical linguistics & phonetics*, *17*(3), 173-197. https://doi.org/10.1080/0269920021000047864

Chapman, K. L., Hardin-Jones, M., Schulte, J., & Halter, K. A. (2001). Vocal development of 9-month-old babies with cleft palate. *Journal of Speech, Language, and Hearing Research.* https://doi.org/10.1044/1092-4388(2001/099)

Counihan, D. T. (1956). *A clinical study of the speech efficiency and structural adequacy of operated adolescent and adult cleft palate persons*. Northwestern University.

Counihan, D. T. (1960). Articulation skills of adolescents and adults with cleft palates. *Journal of Speech and Hearing Disorders*, *25*(2), 181-187. https://doi.org/10.1044/jshd.2502.181

Dalston, R. M. (1990). Communication skills of children with cleft lip and palate: a status report. *Multidisciplinary management of cleft lip and palate. Philadelphia: WB Saunders*, 746-749.

Deepthi, K. J., & Pushpavathi, M. (2017). An Overview of Vowel and Consonant Production by Four Kannada Speaking Preschool Children with Repaired Cleft Lip and Palate. *Global Journal of Otolaryngology, 9(3).*

Fete, M., Vanbokhoven, H., Clements, S. E., McKeon, F., Roop, D. R., Koster, M. I, & Bree, A. F. (2009). International research symposium on ankyloblepharon-ectodermal defects- cleft lip/palate (AEC) syndrome. *American Journal of Medical Genetics Part A*, *149*(9), 1885-1893. **https://doi.org/10.1002/ajmg.a.32761**

Ghatage, M. M. (2013). Pronunciation problems of the Marathi speakers. *Language in India*, *13*(4), 107-115.

Gopishankar, &Pushpavathi, M. (2012). An Acoustic study of sibilant/s/ in individual with cleft lip and palate. *In proceedings of Frontiers of Research on Speech and Music, Gurgaon, New Delhi.*

Goswami, S. P., Shanbal, J. C., Samasthitha, S., & Navitha, U. (2012). Field testing of manual for adult: non-fluent aphasia therapy in Kannada (MANAT-K). *Journal of the All India Institute of Speech & Hearing, 31*.

Hardin-Jones, M. A., & Chapman, K. L. (2018). The implications of nasal substitutions in the early phonology of toddlers with repaired cleft palate. *The Cleft Palate-Craniofacial Journal*, *55*(9), 1258-1266. https://doi.org/10.1177/1055665618767421

Hardin-Jones, M. A., & Jones, D. L. (2005). Speech production of preschoolers with cleft palate. *The Cleft palate-craniofacial journal*, *42*(1), 7-13. https://doi.org/10.1597/03-134.1

Hegde, M. - Peña-Brooks, M.A. (2007) *Sound Stimuli for /K/ /G/ /M/ /N/ /Ŋ/ /L/, Book 3 for Treatment Protocols for Articulation and Phonological Disorders* Published: Plural Publishing.Inc.

Hegde, M. - Peña-Brooks, M.A. (2007) *Sound Stimuli for /T/ /D/ /ʧ/ /ʤ/ /Σ/ /Ʒ/, Book 2 for Treatment Protocols for Articulation and Phonological Disorders* Published: Plural Publishing.Inc.

Hegde, M. - Peña-Brooks, M.A. (2007) *Sound Stimuli for /θ/ /ð/ /r/ /ɚ/ /ɝ/ /w/ /h/ /j/,Book 4 for Treatment Protocols for Articulation and Phonological Disorders.*PluralPublishing. Inc.

Hemalatha (2011) Development of articulation drill book for cleft palate population in Telegu. *Student research at AIISH* (Articles based on dissertation done at AIISH). All India Institute of Speech and Hearing, Manasagangothri, Mysore

Henningsson, G., Kuehn, D. P., Sell, D., Sweeney, T., Trost-Cardamone, J. E., & Whitehill, T. L. (2008). Universal parameters for reporting speech outcomes in individuals with cleft palate. *The Cleft Palate-Craniofacial Journal*, *45*(1), 1-17. https://doi.org/10.1597/06-086.1

Jain, D., & Cardona, G. (2004). The Indo-Aryan Languages (1st ed.). Routledge. https://doi.org/10.4324/9780203945315

John, A., Sell, D., Sweeney, T., Harding-Bell, A., & Williams, A. (2006). The cleft audit protocol for speech—augmented: A validated and reliable measure for auditing cleft speech. *The Cleft palate-craniofacial journal*, *43*(3), 272-288. https://doi.org/10.1597/04-141.1

Kawano, M., Isshiki, N., Harita, Y., & Tanokuchi, F. (1985). Laryngeal fricative in cleft palate speech. *Acta Oto-Laryngologica*, *98*(sup419), 180-188. https://doi.org/10.1080/00016489.1985.12005671

Kelkar, A. R. (1958). *The phonology and morphology of Marathi*. Cornell University.

Kummer, A. W. (2011, May). Speech therapy for errors secondary to cleft palate and velopharyngeal dysfunction. In *Seminars in speech and language* (Vol. 32, No. 02, pp. 191-198). © Thieme Medical Publishers.

M. Hegde, Ph.D., Adriana Peña-Brooks, M.A. (2006) *Sound Stimuli for /p/ /b/ /f/ /v/ /s/ /z/, Book for Treatment Protocols for Articulation and Phonological Disorders.* Plural publishing. Inc.

Manjunath, S., Pushpavathi, M., & Sankar, R. G. (2022). Impact of articulation therapy on perceptual characteristics of bilabials in children with repaired cleft lip and palate. *Journal of Cleft Lip Palate and Craniofacial Anomalies*, *9*(1), 7. 10.4103/jclpca.jclpca_15_21

Masica, C. P. (1993). *The indo-aryan languages*. Cambridge University Press. McDermott, R. P. (1962). *A study of/s/sound production by individuals with cleft palates*. The university of iowa.

McWilliams, B. J. (1958). Articulation problems of a group of cleft palate adults. *Journal of Speech and Hearing Research*, *1*(1), 68-74.

McWilliams, B. J., & Musgrave, R. H. (1971). Diagnosis of speech problems in patients with cleft palate. *British Journal of Disorders of Communication*, *6*(1), 26-32.

Moll, K. L. (1968). Speech characteristics of individuals with cleft lip and palate. *Cleft palate and communication*, 61-118.

Morris, H. L. (1962). Communication skills of children with cleft lips and palates. *Journal of Speech and Hearing Research*, *5*(1), 79-90.

Mossey, P. A., Little, J., Munger, R. G., Dixon, M. J., & Shaw, W. C. (2009). Cleft lip and palate. *The Lancet*, *374*(9703), 1773-1785.

Paul, R. (2001). *Language disorders from infancy through adolescence.* St Louis: Mosby.

Peterson-Falzone, S. J. (1989). Compensatory articulations in cleft palate speakers: Relative incidence by type. In *Proceedings of the International Congress on Cleft Palate and Related Craniofacial Anomalies*.

Peterson-Falzone, S. J., Hardin-Jones, M. A., Karnell, M. P., & McWilliams, B. J. (2001). *Cleft palate speech* (pp. 266-291). St. Louis: Mosby.

Peterson-Folzon, S. J. (1990). A cross-sectional analysis of speech results following palatal closure. *Multidisciplinary management of cleft lip and palate*, 750-757.

Philips, B. J., & Harrison, R. J. (1969). Articulation patterns of preschool cleft palate children. *The Cleft Palate Journal*, *6*(3), 245-253.

Philips, B. J., & Harrison, R. J. (1969). Language skills of preschool cleft palate children. *The Cleft Palate Journal*, *6*(2), 108-119.

Prasad (2011). Development of Articulation Drill Book for Cleft Palate Population in Kannada. *Student research at AIISH* (Articles based on dissertation done at AIISH). All India Institute of Speech and Hearing, Manasagangothri, Mysore.

Reddy, S. G., Reddy, R. R., Bronkhorst, E. M., Prasad, R., Ettema, A. M., Sailer, H. F., & Bergé, S. J. (2010). Incidence of cleft lip and palate in the state of Andhra Pradesh, South India. *Indian journal of plastic surgery*, *43*(02), 184-189. 10.1055/s-0039-1699433

Rezaei, P., Poorjavad, M., & Abdali, H. (2020). Speech outcomes after palatal closure in 3–7-year-old children. *Brazilian Journal of Otorhinolaryngology*.

Riski, J. E. (1979). Articulation skills and oral-nasal resonance in children with pharyngeal flaps. *The Cleft palate journal*, *16*(4), 421-428.

Sandy, J. R., Williams, A. C., Bearn, D., Mildinhall, S., Murphy, T., Sell, D, & Shaw, W. C. (2001). Cleft lip and palate care in the United Kingdom—the Clinical Standards Advisory Group (CSAG) study. Part 1: background and methodology. *The Cleft palate-craniofacial journal*, *38*(1), 20-23.

Savitha, V. H. Early speech and language development in children with cleft lip and palate A longitudinal study.

Shriberg, L. D., & Kwiatkowski, J. (1982). Phonological disorders I: a diagnostic classification system. *Journal of speech and hearing disorders*, *47*(3), 226-241. https://doi.org/10.1044/jshd.4703.226

Spriestersbach, D. C., Darley, F. L., & Rouse, V. (1956). Articulation of a group of children with cleft lips and palates. *Journal of Speech and Hearing Disorders*, *21*(4), 436-445. https://doi.org/10.1044/jshd.2104.436

Spriestersbach, D. C., Moll, K. L., & Morris, H. L. (1961). Subject classification and articulation of speakers with cleft palates. *Journal of Speech and Hearing Research*, *4*(4), 362-372. https://doi.org/10.1044/jshr.0404.362

Trost, J. E. (1981). Articulatory additions to the classical description of the speech of persons with cleft palate. *The Cleft palate journal*, *18*(3), 193-203.

Trost-Cardamone, J. E. (1990). The development of speech: Assessing cleft palate misarticulations. *Cleft lip and palate: A system of management*, 227-235.

Trost-Cardamone, J. E., & Bernthal, J. E. (1993). Articulation assessment procedures and treatment decisions. In K. T. Moller & C. D. Starr (Eds.), *Cleft Palate: Interdisciplinary Issues and Treatment*. Austin, TX: Pro-Ed.

Van Demark, D. R., Morris, H. L., & Vandehaar, C. (1979). Patterns of articulation abilities in speakers with cleft palate. *The Cleft Palate Journal*, *16*(3), 230-239.

VS, A., Pushpavathi, M., & Bonanthaya, K.(2020) *Language Skills and Cognitive Linguistic Skills in Children with Repaired Cleft Palate*. All India Institute of Speech and Hearing, Manasagangothri, Mysore.

Weshley (2011) Development of articulation drill book for cleft palate population in Malyalam. *Student research at AIISH* (Articles based on dissertation done at AIISH). All India Institute of Speech and Hearing, Manasagangothri, Mysore.

Whitehill, T. L., & Chau, C. H. F. (2004). Single- word intelligibility in speakers with repaired cleft palate. *Clinical linguistics & phonetics*, *18*(4-5), 341-355. https://doi.org/10.1080/02699200410001663344

Witzel, M. A. (1991). Speech evaluation and treatment. *Oral and Maxillofacial Surgery Clinics of North America*, *3*(3), 501-516. https://doi.org/10.1016/S1042-3699(20)30522-7

Yadav, S., Modh, Z., & Patel, M. D. (2022). A Retrospective Study on Cleft Lip (Palate) And Associated Anomalies In Childrens. *European Journal of Molecular & Clinical Medicine (EJMCM)*, *9*(01), 2022.

APPENDIX- I

Validation form used for the content validation of the articulation drill stimulus in Marathi.

Adapted from the Manual for Non-Fluent Aphasia Therapy in Kannada

(Goswami et al., 2012)

Sl. No	**Parameters**	**Very Poor**	**Poor**	**Fair**	**Good**	**Excellent**
1.	Simplicity					
2	Proverbility					
3.	Accessibility					
4.	Complexity					
5.	Trainability					
6.	Stimulabilty					
7.	Size of picture					
8	Color and apperance					
9.	Feasibility					
10.	Iconicity					

Format for assessing content validity

The parameters and their operational definition for rating the *word list, paired word list, and sentences* are as follows:

1. **Simplicity:** Are the test stimuli comprehendible?

2. **Proverbiality:** Is the test material familiar to the user?

3. **Accessibility**: Is the test material user-friendly?

4. **Complexity:** Is the material arranged in the increasing order of difficulty?

5. **Trainability**: Can the stimuli be used for intervention purposes in different milieu?

6. **Stimulability**: Does the stimulus material elicit responses from the individuals?

The parameters and their operational definition for rating the *picture stimuli* are as follows:

1. **Size of the picture:** Whether the picture stimuli are of appropriate size?

2. **Color and appearance:** Are the picture stimuli appropriate in terms of colour and dimension?

3. **Iconicity:** Does the picture stimuli appear to be recognizable and representational?

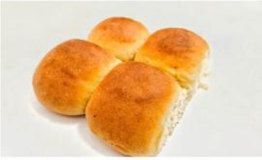
4. **Stimulability**: Does the stimulus material elicit responses from the individuals?

5. **Accessibility**: Is the test material user-friendly?

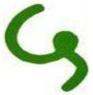
APPENDIX- II

Sample of Picture stimulus for articulation drill book in Marathi. (The entire picture stimuls for articulation drill is provided on CD)

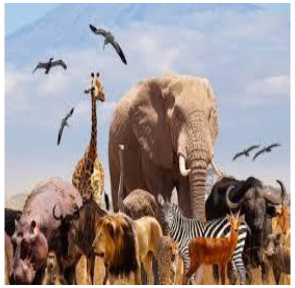
PICTURABLE WORDS
INITIAL /p/



पाव
/pɑ:v/



पाच
/pɑ:ts/



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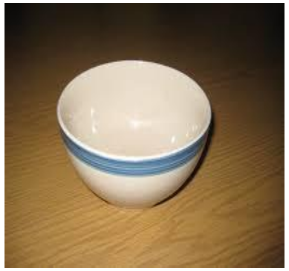

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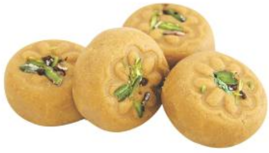

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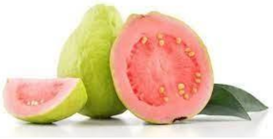

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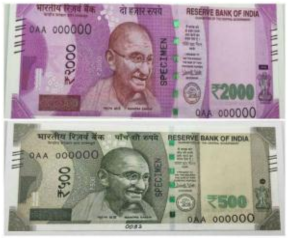

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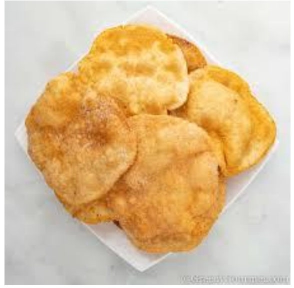

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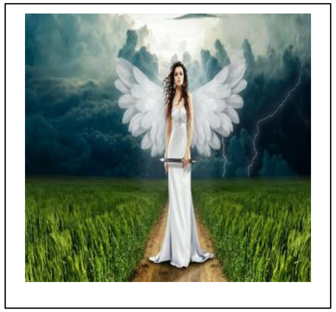
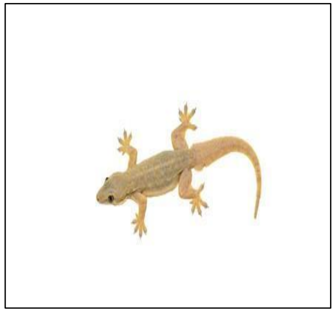
पट्टा
/pəʈʈɑː/

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पोट
/po:t/

परदा
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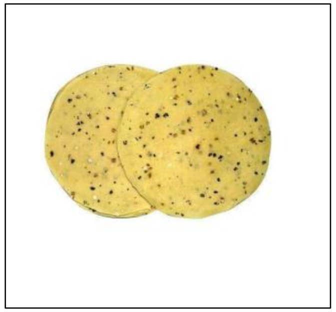

पापड
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पपई
/ pəpəiː/

पुरुष
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/ poːlis/

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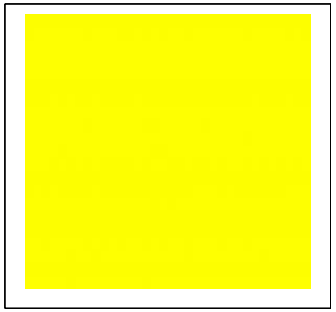

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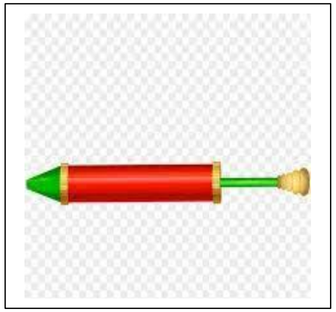

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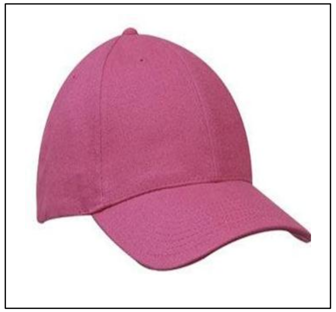
MEDIAL /p/



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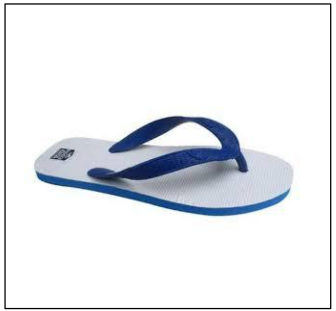

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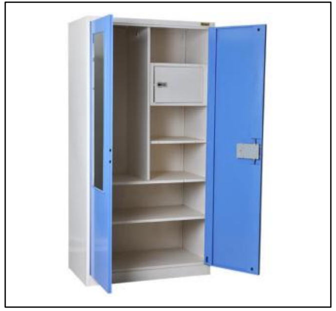

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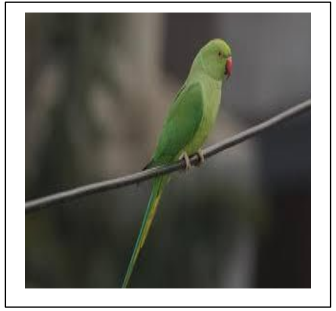

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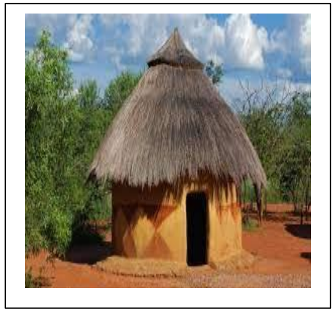

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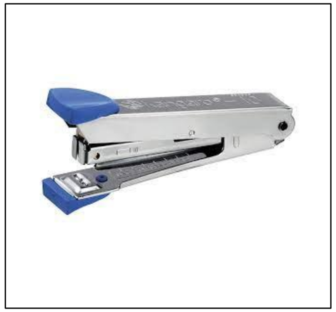

स्टेपलर
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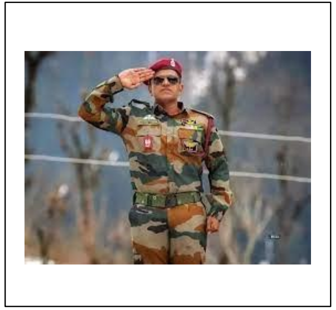

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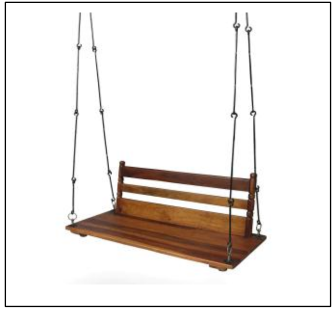

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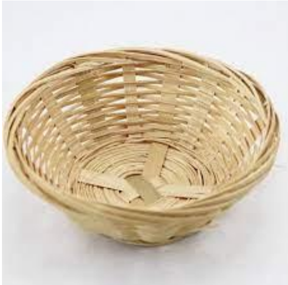

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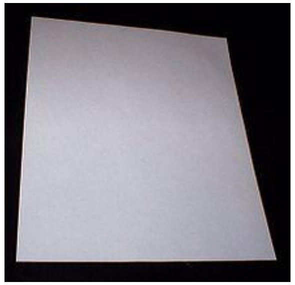

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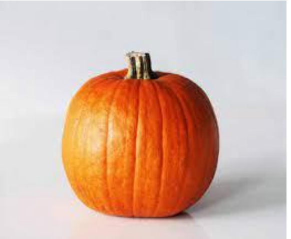

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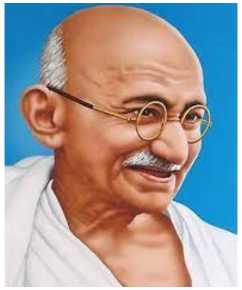

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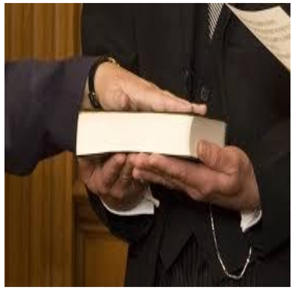

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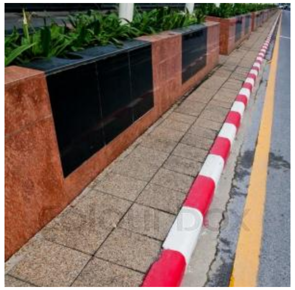

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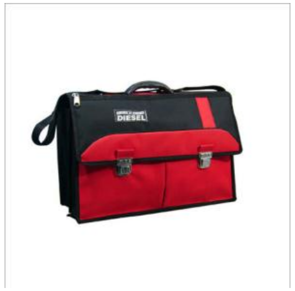

दप्तर
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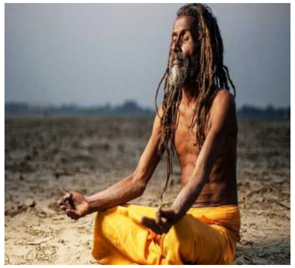

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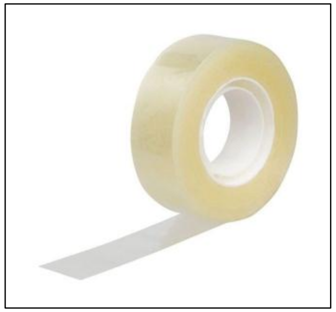

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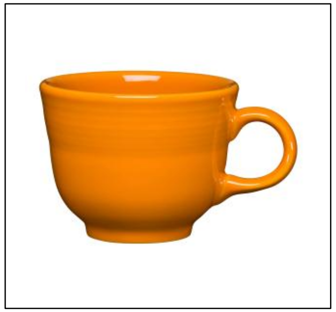

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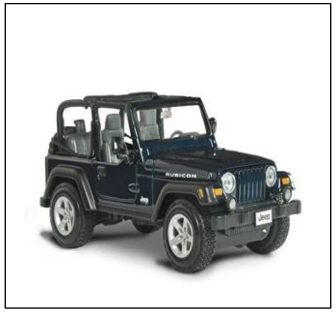

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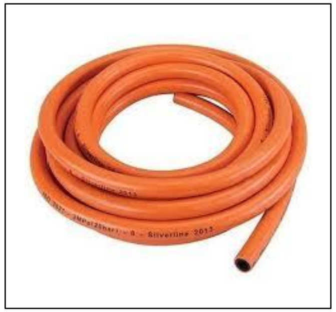

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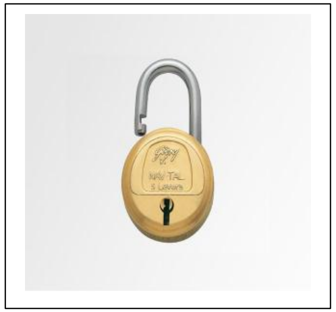

कुलूप
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