THE PHONOLOGICAL INTERFERENCE OF ACEHNESE IN PRONOUNCING INDONESIAN LANGUAGE

**1Dedy Suhery, 2Zahratul Idami, 3Shafrida Wati**

1English Lecturer, Tarbiyah and Teacher Training Faculty, IAIN Langsa, Indonesia

2English Lecturer, Tarbiyah and Teacher Training Faculty, IAIN Langsa, Indonesia

3English Lecturer, Tarbiyah and Teacher Training Faculty, IAIN Langsa, Indonesia

Co. Author Email: shafridawaty@iainlangsa.ac.id

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| ***Article Info*** | **Abstract** |
| ***Article History***  *Received:*  *Revised:*  *Published:* | *Phonological interference is a major challenge in second language production. The objective of this study was to investigate the influence of phonological interference on Acehnese speakers when speaking the Indonesian language, with a specific focus on observing variations in consonant sounds using auditory means. The study conducted a detailed examination of common variances in Indonesian pronunciation among Acehnese speakers. The research was carried out in Langsa, Aceh Province, involving 40 individuals who are native speakers of Acehnese. The participants consisted of 20 males and 20 females, encompassing a range of ages. The collected data was evaluated using the PRAAT software. The findings revealed that there was interference in pronunciation, particularly in the form of devoicing, which is the absence of vowel resonance. This was observed in the words "[ap. di]" and "[ʤa.wap]." This interference leads to a significant level of devoicing, reaching 90% and 100% respectively. Furthermore, the study revealed phonological interference in words such as "[thə.linga]", "[tə.thap]", and "[a.hat]", with speakers demonstrating devoicing rates of 40%, 40%, and 100% respectively. The findings showed the complex nature of phonological interference in the pronunciation of the Indonesian language by Acehnese speakers. These findings served as a foundation for the development of more effective strategies for acquiring a second language, particularly in diglossic environments like Indonesia.* |
| ***Keywords***  *Phonological inference;*  *Pronunciation deviation;*  *Devoicing;* |
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**INTRODUCTION**

Interference and integration are frequently observed linguistic phenomena in multilingual settings. These two linguistic phenomena arise from the interaction between two languages, the first and second. Language contact can have either beneficial or detrimental effects. Interference arises when multilingual individuals exhibit discrepancies between the characteristics of their primary and secondary languages, leading to linguistic inaccuracies. In complex multilingual cultures, language variety has a significant impact on the interaction between different languages. (Arifin, 2016). The phenomenon of language interaction, known as language interference, is responsible for several linguistic effects that are unavoidable (Offiong & Ugot, 2012). Language interference, as defined by Weinreich (1957) is the departure from the linguistic norms of one language that happens in the speech of bilingual individuals due to their proficiency in many languages.

According to the idea proposing that when individuals try to learn a second language, their existing habits sometimes affect the way they speak the target language. This is due to the presence of a latent psychological structure in their brains that will be triggered automatically. It is conceivable for it to make pronunciation errors, akin to those produced by native speakers or second language learners. Language learners generate utterances that differ from those of native speakers, yet they continually strive to convey the same meaning. Consequently, the generation of sounds is altered when learning a second language due to the influence of habits from one's native language. This occurrence is commonly known as interference (Derakhshan & Karimi, 2015).

Indonesia possesses a linguistic diversity with over 580 languages and dialects spoken inside its borders (Lamoureux: 2003). Due to Indonesia's intricate sociocultural context, the majority of its residents possess the ability to learn and use a minimum of two languages: local languages and Indonesian, which serves as the national language. The contemporary Indonesian language has emerged as a result of sociocultural interactions among individuals from diverse ethnic backgrounds, leading to the creation and acceptance of linguistic terminology that are understood and used by its speakers as Indonesian (Hikmat & Solihati: 2013). In fact, individuals' pronunciation can be shaped by their mother tongue and local accents. Occasionally, we can ascertain an individual's place of origin by analyzing their pronunciation of specific words or sounds. Nevertheless, it is crucial to bear in mind that each individual's pronunciation is distinct and can also be influenced by circumstances such as their surroundings, age, and level of education (Muhassin, 2018).

Langsa is a municipality located in the province of Aceh, which is situated in Indonesia. The distance from Banda Aceh city to the location is roughly 400 kilometers. The population of the area in 2021 was estimated to be at 185,622 individuals, resulting in a population density of 707 individuals per square kilometer. Langsa is designated as an administrative city as per Government Regulation Number 64 of 1991, which pertains to the establishment of administrative cities. Langsa City was granted its enhanced status by the enactment of Law Number 3 on June 21, 2001. The establishment date of Langsa was designated as October 17, 2001. The city is renowned for its prominence in education, trade, gastronomy, and tourism.

The city’s population is predominantly composed of Acehnese, Malays, Javanese, Chinese, Gayo, Batak, Alas, and Karo ethnic groups. Langsa is the second most developed and populated city in Aceh province, following Banda Aceh. The predominant languages spoken by the residents of Langsa are Malay and Acehnese. Nevertheless, Indonesian continues to be the predominant language and has evolved into a common language for interethnic communication, particularly when conversing with migrants residing outside Aceh province. The presence of multiple languages increases the likelihood of linguistic interference. This study examines the impact of Acehnese language contact on the Indonesian language in Langsa, specifically focusing on the occurrence of interference and consonant variants.

Numerous studies on phonology and phonetics have been carried out by popular linguists, including Chomsky, Katamba, and Haley. Nevertheless, linguistic professionals, particularly in Indonesia, should devote more attention to the research of sociophonetics, specifically regarding the production and perception of language variants. Hence, the researchers analyze recent studies on sociophonetics and expound on the impact of this research in enhancing the examination of interference and consonant sound variations among Acehnese speakers when speaking the Indonesian language. The scholars who have conducted research on the sociophonetics of language variation production and perception include Rebecca Roeder, Zsuzsana Fagyal, Jen Hay, and Adriano Trovato

Roeder (2011) argues that the conditioning effects of following manner and consonant sounds have the most significant impact. The study demonstrates that the substantial increase of /ae/ before nasal sounds serves as an indicator of adaptation to Non-Continuum Speech (NCS) among Mexican-American English speakers in Lansing. In Fagyal's (2011) study, the author examines the similarities and variations in the individual parts that make up the rhythm patterns observed in the speech of two distinct groups of teenage boys. The recordings were made in a working-class suburb of Paris, France. Therefore, the prediction that AF (French Arabic) readings would exhibit a stronger resemblance to stress-timed languages should be dismissed, as their rhythms align with syllable timing, similar to EF speakers.

Conversely, Hay (2011) states that their logistic regression research revealed a clear association between social class and the occurrence of /r/ insertion. Specifically, individuals from higher social classes had a much lower risk of utilizing disruptive /r/. In addition, he discovered that linguistic elements, such as the previous vowel and the following prefix, had a significant impact on the probability of /r/-insertion. These results cast significant doubt on current phonological analyses that consider intrusive /r/ as a simple, absolute, and non-variable phonological process. The frequency and intensity of /r/ are significantly influenced by linguistic and social factors. These findings also prompt a broader inquiry into the extent to which 'frequency' can be synonymous with 'degree' in other phonological sound alterations that have traditionally been examined as categorical. Trovato (2017) demonstrates that bilingual speakers from El Paso, Texas, can clearly differentiate between bilabial and labiodental voiced segments in terms of auditory perception. Furthermore, this discrepancy was associated with the consonant orthography and position of the linguistic factors inside the word. The key social determinants that had the largest impact on labiodentalisation were the individual's level of proficiency in English writing, competence in Spanish writing, and gender. The most effective auditory indicators for variations in labial sounds in the tested dialects were relative strength and duration.

Moreover, numerous research have been conducted to investigate linguistic interference. As an illustration, Alonso in Alicantina & Ingleses (1997) examined the mistakes made by inexperienced Spanish learners while acquiring English as a second language. He discovered that the majority of the mistakes were due to structural interference stemming from the Spanish language when translating to English. In a study conducted by Erwina (2011), language interference in the Indonesian setting was examined. It was discovered that errors in language usage were mostly caused by the influence of the mother tongue, specifically Javanese, as well as the use of slang and foreign languages including Arabic, English, and Dutch. Fauziah (2015) states that Angkola Batak undergraduate students exhibit two forms of pronunciation deviations: devoicing and allophonic shift. The allophonic shift specifically involves a transition between /ə/ and /e/, as well as between /e/ and /ə/. Deviations exclusively manifest in the middle and final positions of the syllable. During all reported instances of devoicing alternations, the phoneme /b/ is realized as [p], /d/ is realized as [t], and /g/ is realized as [k]. However, the alternation exclusively takes place when the phoneme is positioned as the coda of the syllable, and no alternation is observed in the starting position. Suhery (2018) argues that phonological interference in Indonesian phrases from the Singkil language might be attributed to certain phonological processes, such as fortition (reinforcement). Fortition of the sound 'x→k' in the word 'worry' [xawatIr] changes to [kawatIr]. The sound 'f→p' in the word 'factor' [factor] transforms into [paktor]. The sound 'v→p' in the word 'voli' [voli] turns into [poly]. The sound 'z→ɟ' in the word 'nutrition' [nutrition] becomes [giɟi]. Glottal insertion (ʔ) occurs in words like 'until' [until], which becomes [sampɛʔ]. Loss of aspiration (deaspiration) happens in words like 'far' [ɟauh], which becomes [ɟau:]. The sound 'b→p' voicing occurs in words like 'sabtu' [sabtu], which becomes [saptu]. The sound 'd→t' occurs in words like 'maksud' [maksud], which becomes [maksut]. Monophthongisation occurs in words like 'or' [or], which becomes [ato]. Loss of initial consonant happens in words like 'alone' [saɟa], which becomes [a a]. Loss of initial syllables occurs in words like 'once' [səkali], which becomes [times]. Loss of vowels occurs in words like 'that' [it], which becomes [tu]. Lastly, front vowels change from 'o→e' in words like 'number' [number], which becomes [number] and in the context of a pretest, the pronunciation of 'near' [dəkat] changes to [dəket].

The study conducted by Weda & Sakti, (2018) aimed to investigate the impact of formal instruction on the learning of English short vowels among students enrolled in the English Literature Study Program at the Faculty of Languages and Literature at Universitas Negeri Makassar, Indonesia. Their research findings demonstrated that formal training had a substantial impact on enhancing the students' capacity to acquire English short vowels. Additionally, it was shown that a significant proportion of the students exhibited a tendency to inaccurately transcribe brief vowels as extended vowels. As an illustration, they frequently substituted the letter ǝ with e, such as in the word "docter," and replaced the letter ɪ with i, as seen in the word "sit." This implies that the students may have encountered difficulties in accurately distinguishing between short and long vowel sounds in the English language. The findings underscore the significance of well-executed formal teaching in tackling this matter and enhancing the students' aptitude in accurately articulating and transcribing English short vowels.

In a study conducted by Akhyaruddin (2011), the researcher examined the impact of the Bugisnese language on the acquisition of the Indonesian language. The research appears to have concentrated on examining the interference in the oral language of students, particularly those who had Buginese as their native language. The study discovered three categories of interferences: phonological, morphological, and syntactic. It is noteworthy that the interference in communication at school is not intentional, but rather arises from the impact of everyday life, leading to the presence of Buginese features.

Utami et al., (2017) did a study to examine the phonological interference of students' native language in their pronunciation of English sounds. They discovered that there are three primary elements that impact children while pronouncing English words. (1) The interlingual component pertains to the impact of the pupils' native language (L1) on their English pronunciation. The phonetics and phonological patterns of their mother tongue can impact their proficiency in appropriately articulating English phonemes. (2) The phenomenon of overextension of analogy: This element indicates that students may mistakenly use the pronunciation patterns of their native language while pronouncing English words, even if those patterns do not actually apply. For instance, individuals could employ comparable phonetic or structural elements from their mother tongue when articulating English vocabulary, leading to inaccurate pronunciation. (3) Structural transfer: This element suggests that students may apply the grammatical structure of their native language to English words, thus impacting their pronunciation as well. This may entail the application of erroneous stress patterns or intonation derived from their mother tongue to English words. The study posits that Buginese and Makassarese pupils possess knowledge of the pronunciation norms in English, although occasionally fail to execute them accurately. The potential causes for this forgetting include interference from their first language, memory problems, psychological concerns, or a lack of comprehension of the subject matter. These variables can impede their capacity to regularly articulate English consonants with precision.

However, there is a lack of study conducted on language interference in Indonesian contexts, specifically involving Acehnese, particularly utilizing acoustic phonetic analysis. This subsequently emerges as the distinctive feature of the present investigation. This study aims to examine whether Acehnese speakers exhibit dissimilarities in consonantal variation while speaking the Indonesian language. It also analyzes the overall characteristics of pronunciation deviations in Indonesian that may produce by Acehnese speakers residing in Langsa. Additionally, it seeks to determine how acoustic phonetic measures can capture the difference in sound variation that occur.

Interference is the act of obstructing or impeding something, as well as the process of blending or combining elements together. linguistic transfer, often known as linguistic interference, implies that some form of influence is necessary for it to happen (Odlin, 2005). Weinreich was the inaugural linguist to employ the term 'interference' in the context of language usage. According to Dulay et al (1982) as cited in Bhela (1999), interference is defined as the unconscious transfer of the superficial characteristics of the native language to the surface of the second language due to habitual patterns. The phrase refers to a phenomenon when bilingual people blend or incorporate components from a foreign language into the language they are using, resulting in alterations to the linguistic system (Budiarti, 2013). According to Sekartaji (2013) there is a strong correlation and reciprocal impact between bilingualism and interference. An everyday event that exemplifies this is when someone employs language as a means of communication. In Indonesian society, the linguistic condition of most Indonesian speaking communities is defined by the usage of two languages: the local language as the mother tongue and Indonesian as the national language. This type of usage scenario can result in the amalgamation of regional dialects and the Indonesian language. Bilingualism refers to the practice of utilizing two languages interchangeably, which might potentially result in interference.

Moreover, various factors elicit language interference, which manifests in both oral and written communication. Sekartaji (2013) identifies vocabulary characteristics, notably in the word and grammatical structure of two languages, as the primary factor responsible for interference. In his study, (Sukardi, 1999) identifies additional elements that contribute to interference, such as bilingualism. Bilingual speakers experience language contact, which can influence the source language through the influence of foreign or local languages. Language interaction ultimately leads to interference. The Acehnese and Indonesian languages underwent language contact in this study. The lack of knowledge regarding linguistic rules and the incorporation of aspects from other languages also leads to the occurrence of diverse forms of interference. The impact of native languages on individuals' usage of their second language is another contributing aspect. For instance, when a youngster starts to communicate, they are introduced to Acehnese, indicating that Acehnese is their first language. Utilizing Acehnese in other languages on a regular basis might lead to a fusion of vocabulary and linguistic structures. For instance, when individuals converse in Indonesian, a bilingual individual may possess a mental representation of the Indonesian language. However, what emerges unexpectedly is not the vocabulary of the Indonesian language, but rather the vocabulary or linguistic patterns from the Acehnese language, with which the individual is acquainted. This scenario may arise as a result of a disparity in the process of acquiring language. The reason for this is the challenges faced by native speakers of a first language when employing a second language. Bilingual individuals tend to include a greater number of linguistic components from their original language, rather than the second language they are currently using.

**RESEARCH METHOD**

**Research Design**

This study employed a descriptive qualitative technique, especially utilizing a case study research design with the support of descriptive quantification, in accordance with the nature of the research issue. Qualitative research is a method of investigation that aims to comprehend social or human issues by constructing a comprehensive and interconnected representation using verbal descriptions, presenting in-depth perspectives of those involved, and carried out in authentic environments (Creswell, 2014).

The research utilized a descriptive case study as its selected method of analysis. Descriptive case studies seek to provide a comprehensive and in-depth comprehension of a specific occurrence within its context. Hence, this design aligns with the study's objectives, which aimed to examine if Acehnese speakers exhibit differences in consonant variation when speaking Indonesian, analyze the overall characteristics of Indonesian pronunciation deviations made by Acehnese speakers residing in Langsa, and determine which gender demonstrates significant and minimal phonological interference within the speech community. The data were obtained by conducting comprehensive interviews and recording the speakers' utterances.

**Location and Subject**

The research was conducted in Langsa and involved a sample 40 participants, comprising an equal number of males and female who are proficient in the Acehnese language. The subjects were purposefully selected based on specified features. The informants are selected based on specific criteria; Langsa residents who are native speakers, age ranging from 10 to 61 years and older, hhysically and cognitively sound (without speech impairments), education at the level of primary school, proficient in both Acehnese and Indonesian languages, and acquire proficient mother tongue (Nida, 1949).

The age range of the subjects in this study is between 10 to 20 years old, 21 to 40 years old, 41 to 60, and 61 years old and above. The table below displays the distribution of informants according to their gender and age.

Table 1

Subject Description

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Gender | Age 10 - 20 years old | Age 21 - 40 years old | Age 41 - 60 years old | Age 61 years old and above | Total |
| Male | 5 | 5 | 5 | 5 | 20 |
| Female | 5 | 5 | 5 | 5 | 20 |

**Data Collection**

The analyzed and researched sounds were limited to three consonant plosives: /b/, /d/, and /t/. The participants were instructed to identify several words, including: Abdi, jawab, telinga, tetap, and ahad. Subsequently, their vocalizations were recorded utilizing a TASCAM recorder.

**Data Analysis**

After the data were collected, they were transcribed and analyzed using software known as PRAAT. PRAAT is a open-source software program that is utilized for the examination, generation, and manipulation of sound (Boersma & van Heuven, 2001). An inherent constraint of this software is its lack of editing functionality. Consequently, the Wave pad sound editing software was utilized to trim the audio file.

Before transcription, the recordings were transcribed using orthographic transcription by a single native Indonesian speaker. The use of a native Indonesian speaker in the transcribing process aimed to reduce the occurrence of copying errors. The transcriptions were subsequently compared, and any discrepancies were resolved through the process of negotiation. Subsequently, any divergences from the desired sound generated by the participants were gathered. The frequency of deviations was thereafter computed and subsequently compared utilizing a scale developed by Thorsten (1992) as cited by (Salma, 2013), denoted as: P = F/N (P= Percentage, F= Frequency, and N= Number of participants).

**RESEARCH FINDINGS AND DISCUSSION**

**Research Findings and discussion**

The research findings indicated that among all the phonemes produced by the subjects, a specific sort of pronunciation defect seen was devoicing. Below is a summary of the pronunciation variations.

Table 2

Pronunciation Deviations Produced by Participants

|  |  |  |  |
| --- | --- | --- | --- |
| Types of Deviation | Measurement | Frequency | Percentage (%) |
| Devoicing | Reading Task | - | - |
| Abdi | 36 | 90% |
| Jawab | 40 | 100% |
| Telinga | 16 | 40% |
| Tetap | 16 | 40% |
| Ahad | 40 | 100% |

Devoicing involves Crowley's classification of lenition, where the voice undergoes a weakening process. The above table depicts the many types of pronunciation variations seen in participants. These deviations were determined by having the participants read words and subsequently rate the frequency of each deviation. The following is a description of the table above:

The researchers identified many instances of pronunciation abnormalities in the reading task, which were classified as "devoicing". Devoicing is the phonological phenomenon in which voiced consonants, such as /b/ and /d/, are articulated without vocal cord vibration, resembling voiceless consonants. However, the phoneme /t/ is often spoken with a sudden release of air and without vocal cord vibration, but in this case, it is pronounced [th] with a forceful release of air and with vocal cord vibration.

1. The participants’ pronunciation of the word [ab.di]:

The participant said the word “Abdi” with devoicing 36 times. This led to a deviation in devoicing of nearly 90%. Typically, the term Abdi is spoken with consonantal sound vibration [ab.di]. On the contrary, the participants articulated it without the phonetic resonance [ab.di]. ticipants’ pronunciation of the word [ap.di]:

1. The participants’ pronunciation of the word [ʤa.wap]:

The participant who pronounced the word [ʤa.wap] encountered 40 occurrences of devoicing variation during the reading activity. The outcome yielded a deviation percentage of 100% in terms of devoicing. It is evident that in every instance, the participant consistently pronounced the consonant that should have had the sound vibration [ʤa.wab] as [ʤa.wap].

1. The participant pronounced the word [thə.linga]:

A total of 16 occurrences of devoicing variation were detected when the participant articulated the word "telinga" throughout the reading task. This participant exhibited a devoicing deviance of 40%. This demonstrated that in few instances, the participants articulated the consonant with an aspirated phonation in [thə.linga], while in the majority of situations, they pronounced it without any phonatory vibration [te.linga].

1. The participant pronounced the word [tə.thap]:

The participant who pronounced the word [tə.thap] also exhibited 16 occurrences of devoicing deviance throughout the reading test. The devoicing deviance exhibited a 40% rate, mirroring the trend observed in participants who articulated the word [tə.thap].

1. Participants pronouncing the word [a.hat]:

The participant who articulated the word [a.hat] exhibited 40 occurrences of devoicing variation during the reading test, resulting in a devoicing rate of 100%. This demonstrates that in every instance, the term [a.hat] should have been articulated as [a.had] without any vocal quivering.

Based on the data, it can be observed that participants commonly diverge from devoicing pronunciation during reading activities. The degree of variance ranges from 40% to 100% and is contingent upon the participant. The findings revealed that the participants' pronunciation style was influenced by their linguistic features or their native language.

Devoicing

The consonants investigated in this research were plosives, as determined by the pilot test conducted prior to the study. Plosives, also known as stops, are noises that involve (1) the blockage of airflow from the lungs by a specific articulator, (2) the compression of air pressure, and (3) the subsequent release of the blockage. To overcome the challenge of identifying plosives just through audio, further acoustic analysis was conducted utilizing PRAAT software. In spectrographic presentation, plosives are typically identified by the presence of silence (stop-gap) or a noticeable decrease in signal intensity, which corresponds to a period of articulatory blockage where little to no energy is produced. However, it is also contingent upon the prosodic conditions. Subsequently, there is a surge of vigor, like to the release of a closure.

When identifying and distinguishing each plosive, two aspects must be taken into account. One aspect is the distinction between fortis and lenis consonants, which refers to the differentiation between voiced and voiceless sounds. Based on Yavas (2011: 108), the following signs can assist in identifying stops in relation to this dimension:

1. Length of the stop-gap or silent during the concluding phase. The duration of the silent phase for the sound /t/ is greater than that of /b/ and /d/.
2. The spectrogram exhibits voice bars, which are dark bars typically seen at frequencies below 250 Hz. Nevertheless, this is one of the least distinguishing attributes of stop sounds, as it can only be employed to differentiate /t/ from /b,d/ in positions between vowels. In such cases, /b,d/ will exhibit a vocalic bar suggesting voicing, whilst /p,t/ will not.
3. Emitting a sudden surge represented by a distinct vertical spike. Typically, there is a greater increase in intensity for the sound /t/ compared to the sounds /b/ and /d/. Velar stops are more susceptible to non-release compared to bilabials or alveolars.
4. Aspiration is the occurrence of a short friction sound that happens before the creation of a vowel and typically lasts than 30 milliseconds. It manifests in the articulation of /t/ at the beginning of the emphasized syllable. Aspiration and bursts of release are distinct in terms of duration, with aspiration lasting longer than bursts of release.

After analyzing the data in accordance with the guidelines, it was determined that bilingual individuals encountered difficulties in producing voiced plosives /b/ and /d/. They have a tendency to convert voiced plosives, particularly those in the final position, into voiceless plosives. Alternation, or devoicing, is the phenomenon when there is a loss of sound in final obstruents, typically happening at the end of a syllable. Crowley, (1997) categorizes this phonetic transformation as lenition, wherein a stronger sound undergoes a transition to a weaker sound. During all reported deviations, the phoneme /b/ is manifested as [p], while the phoneme /d/ is manifested as [t]. However, the alternation exclusively takes place when the phoneme is positioned as the coda of the syllable, and no alternation is observed in the starting position. The table below illustrates this.

Table 3

The devoicing alternations seen in the preceding word list.

| Phonem | Input |  | Participants Actual Pronunciation | Deviation | Participants |
| --- | --- | --- | --- | --- | --- |
| B | /abdi/ |  | [ap.di] | [ b → p] |  |
|  |  |  |  |  | P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P16, P17, P18, P19, P20, P21, P22, P23, P24, P26, P27, P28, P29, P30, P31, P32, P34, P35, P37, P38, P39, P40, |
| B | /jawab/ |  | [ʤa.wap] | [ b → p] | All Participants  (P1 - P40) |
|  |  |  |  |  | P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19, P20, P21, P22, P23, P24, P25, P26, P27, P28, P29, P30, P31, P32, P33, P34, P35, P36, P37, P38, P39, P40. |
| T | /telinga/ |  | [thə.liŋa] | [t →th ] |  |
|  |  |  |  |  | P8, P12, P14, P16, P23, P24, P28, P29, P30, P31, P33, P34, P35, P36, P37, P38. |
| T | /tetap/ |  | [tə.thap] | [t →th ] |  |
|  |  |  |  |  | P8, P12, P14, P16, P23, P24, P28, P29, P30, P31, P33, P34, P35, P36, P37, P38. |
| D | /ahad/ |  | [a.hat] | [ d → t] | Whole participants  (P1 - P40) |
|  |  |  |  |  | P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19, P20, P21, P22, P23, P24, P25, P26, P27, P28, P29, P30, P31, P32, P33, P34, P35, P36, P37, P38, P39, P40. |

The above table displays the pronunciation of plosive consonant phonemes /b/, /t/, and /d/, along with observations of pronunciation abnormalities observed in several participants. The results were described as follows:

A phoneme is a linguistic element that carries semantic significance and represents a distinct sound in a language. The phonemes noticed in the table are the plosive consonants /b/, /t/, and /d/.

Inputs consist of words that contain the phonemes that have been observed. As an illustration, in the initial line, the input is "/abdi/", whereby the phoneme /b/ is present.

The term "actual pronunciation" refers to the precise representation of the input's pronunciation in a phonetic transcription. As an illustration, the phonetic transcription of "/abdi/" is [ap.di]. Deviation is the disparity between the actual pronunciation and the anticipated standardized form. These abnormalities manifest as alterations in particular phonemes or sounds. For instance, the notation [b → p] indicates a shift in the pronunciation of the sound /b/ to [p].

Participants refer to the group of individuals that were observed and studied in this research. The labels assigned to them are P1 and P2.

In line 1, the outcome (b /abdi/ ... [b → p]) indicates that participants P1 to P40 pronounced the phoneme /b/ as [p] in the word "/abdi/". This is an instance of deviation in which the anticipated pronunciation of the sound /b/ is altered to [p]. In line 2 (b /answer/ All Participants): The phoneme /b/ in the word "/answer/" is consistently pronounced as [p] by all participants, ranging from P1 to P40. These findings indicate that all participants had a comparable divergence in the enunciation of this term. Next, in line 3, the phoneme /t/ in the word "/ear/" is pronounced as [th] by the participants indicated in the Respondent column. Only the individuals indicated in this row encountered this variance in this specific word. Subsequently, in line 4 (t /tetap/ [t →th]), the phoneme /t/ in the word "/tetap/" is articulated as [th] by the individuals named in the response column. Only the subjects named in this row encountered this variance in this specific word, just like before. In line 5, all participants (from P1 to P40) pronounced the phoneme /d/ in the word "/ahad/" as [t]. These findings indicate that all participants had a comparable divergence in the enunciation of this term.

Acoustic phonetics analysis

The study identified the occurrence of devoicing, wherein voiced sounds, typically consonants, undergo a transition to a voiceless or almost voiceless state under specific circumstances. Devoicing is a widespread phenomenon in many languages worldwide, and the purpose of acoustic analysis of devoicing alternations is to identify and examine the acoustic modifications that take place during this process. The study establishes a connection between the duration of consonants and vowels and the occurrence of devoicing, which refers to the transformation of a voiced stop sound into a voiceless sound or a sound that resembles a vowel. The duration of consonants and vowels can impact the occurrence of devoicing, as duration is a key acoustic attribute that can influence the quality of sounds.The table below presents a summary of the results from the acoustic phonetic analysis on the duration of voiced and voiceless plosive consonants in the initial, middle, and final positions as produced by the participants.

Table 4

Duration of Voiceless Plosive Consonants [ap.di] and [ʤa.wap] Produced by Male Participants

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No | Participants | Age  (Year) | Duration  [ap.di] | Duration  [b → p] | [ʤa.wap] | [b → p] |
| 1 | P 1 | 13 | 0.16555 ms | 0.0072 ms | 0.45552 ms | 0.1733 ms |
| 2 | P 2 | 19 | 0.86456 ms | 0.1845 ms | 0.662463  ms | 0.2351ms |
| 3 | P 3 | 11 | 0.915763 ms | 0.3044 ms | 0.534913 ms | 0.1849 ms |
| 4 | P 4 | 12 | 0.720049 ms | 27744 ms | 0.570429 ms | 0.1650  ms |
| 5 | P 5 | 10 | 0.900741 ms | 0.213988 ms | 0.537459 ms | 0.1620 ms |
| 6 | P 6 | 25 | 0.318540 ms | 0.0564 ms | 0.455228 ms | 0.0950 ms |
| 7 | P 7 | 35 | 0.404002 ms | 0.0653 ms | 0.354992 ms | 0.0582 ms |
| 8 | P 8 | 23 | 0.476581 ms | 0.0682 ms | 0.446498 ms | 1.4018 ms |
| 9 | P 9 | 29 | 0.513996 ms | 0.0922 ms | 0.386634 ms | 0.0642 ms |
| 10 | P 10 | 39 | 0.640606 ms | 0.1202 ms | 0.790326 ms | 0.0713 ms |
| 11 | P 11 | 45 | 0.494414 ms | 0.1133 ms | 0.353153 ms | 0.1191 ms |
| 12 | P 12 | 55 | 0.473418 ms | 0.0813 ms | 0.334283 ms | 0.1053 ms |
| 13 | P 13 | 50 | 0.419849 ms | 0.0962 ms | 0.565031 ms | 0.1002 ms |
| 14 | P 14 | 52 | 0.496667 ms | 0.0873 ms | 0.393700 ms | 0.1112 ms |
| 15 | P 15 | 43 | 0.538806 ms | 0.1093 ms | 0.529353 ms | 0.1213 ms |
| 16 | P 16 | 61 | 0.583615 ms | 0.0942 ms | 0.524109 ms | 0.0942 ms |
| 17 | P 17 | 68 | 0.561903 ms | 0.0755 ms | 0.431919 ms | 0.086 ms |
| 18 | P 18 | 61 | 0.643687ms | 0.1232 ms | 0.397407 ms | 0.132 ms |
| 19 | P 19 | 61 | 0.626618 ms | 0.1701 ms | 0.563406 ms | 0.162 ms |
| 20 | P 20 | 61 | 0.824348 ms | 0.1802 ms | 0.804814 ms | 0.160 ms |

The data presented above illustrates the time measurements of the participants’ pronunciation of [ap.di] and [ʤa.wap], both before the consonant [b] transition to [p]. The data was collected to analyze the variation in the time of pronunciation for specific consonants in a particular language. The data comprised participants' names and gender, with the age of each participant recorded as an additional variable that could potentially influence the pronunciation pattern. The primary data recorded was the pronunciation duration, measured in milliseconds, for each pronunciation condition and word type. Participants exhibited variability in the duration of articulation of [ap.di] before [b] and transitioning to [p]. In the initial participant, the duration of pronunciation for [ap.di] prior to [b] was 1.656327 milliseconds, while before [p] it was 0.071134 milliseconds.

Furthermore, the data revealed variations in the length of articulation for [ʤa.wap], prior to [b] and [p]. As an illustration, in the second participant, the length of time it takes to pronounce [ʤa.wap] before [b] is 0.862782 milliseconds, and before [p] is 0.180 milliseconds. This suggests that there are differences in the length of pronunciation in specific pronunciation situations prior to the sounds [b] and [p] in the two categories of words. Certain participants exhibit substantial temporal disparities between the sounds [b] and [p] in both word types, whilst others may display less variability. The table below presents the data arranged in descending order of duration for each male participant, categorized by age.

Table 5

The maximum and minimum duration for each male participant categorized by age

|  |
| --- |
| No Participant Age Duration [ap.di] Duration [b → p] Duration [ʤa.wap] Duration [b → p] |
| 1 P 3 11 thn 0.915763 ms 0.3044 ms 0.534913 ms 0.1849 ms |
| 2 P 5 10 thn 0.900741 ms 0.213988 ms 0.537459 ms 0.1620 ms |
| 3 P 4 12 thn 0.720049 ms 0.27744 ms 0.570429 ms 0.1650 ms |
| 4 P 1 13 thn 0.16555 ms 0.00723 ms 0.45552 ms 0.1733 ms |
| 5 P 2 19 thn 0.86456 ms 0.1845 ms 0.662463 ms 0.2351 ms |
| 6 P 6 25 thn 0.318540 ms 0.0564 ms 0.455228 ms 0.0950 ms |
| 7 P 8 23 thn 0.476581 ms 0.068 ms 0.446498 ms 1.4018 ms |
| 8 P 9 29 thn 0.513996 ms 0.092 ms 0.386634 ms 0.064 ms |
| 9 P 7 35 thn 0.404002 ms 0.0653 ms 0.354992 ms 0.058 ms |
| 10 P 10 39 thn 0.640606 ms 0.120 ms 0.790326 ms 0.071 ms |
| 11 P 11 45 thn 0.494414 ms 0.113 ms 0.353153 ms 0.119 ms |
| 12 P 15 43 thn 0.538806 ms 0.109 ms 0.529353 ms 0.121 ms |
| 13 P 14 52 thn 0.496667 ms 0.087 ms 0.393700 ms 0.111 ms |
| 14 P 13 50 thn 0.419849 ms 0.096 ms 0.565031 ms 0.100 ms |
| 15 P 19 61 thn 0.626618 ms 0.170 ms 0.563406 ms 0.162 ms |
| 16 P 18 61 thn 0.643687 ms 0.123 ms 0.397407 ms 0.132 ms |
| 17 P 20 61 thn 0.824348 ms 0.180 ms 0.804814 ms 0.160 ms |
| 18 P 12 55 thn 0.473418 ms 0.081 ms 0.334283 ms 0.105 ms |
| 19 P 16 61 thn 0.583615 ms 0.094 ms 0.524109 ms 0.094 ms |
| 20 P 17 68 thn 0.503280 ms 0.075 ms 0.431919 ms 0.086 ms |

The table displayed the duration ordered from the highest to the lowest, for each participant and age group. The data is arranged according to the duration of the word "abdi" [ap.di], leading to the subsequent sequence of participants:

1. Participant P3, who was 11 years old, had the longest [ap.di] with a length of 0.915763 milliseconds.
2. Participant P5, who was 10 years old, had a [ap.di] duration of 0.900741 ms.
3. Participant P4, who is 12 years old, has an auditory perception duration of 0.720049 milliseconds. ...and so on in sequential order.

Next, the data is arranged in ascending order based on the duration from b to p.

1. Participant P 1 exhibits the greatest duration of [b → p] at 0.00723 ms.
2. Participant P 2 has a duration of 0.1845 ms for the [b → p] task.
3. Participant P 3 has a duration of 0.3044 ms for the [b → p] event. ...and so forth in sequential order.

Subsequently, the data is organized according to the period of [ʤa.wap]:

Participant P 10 has the highest duration of [ʤa.wap], which is 0.790326 ms.

Participant P5, who is 10 years old, has a [ap.di] duration of 0.900741 ms.

Participant P4, who is 12 years old, has a duration [ap.di] of 0.720049 ms. ...and so on in sequence.

Ultimately, the data is arranged in ascending order based on duration [b → p]:

Participant P 8 has the longest duration of [b → p] at 1.4018 ms.

Participant P 2 has a duration of 0.235154 ms for the [b → p] task.

Participant P 6 has a duration of 0.0950 ms for the [b → p] event. The events are listed in sequential sequence.

The above table displays the duration of consonant sounds and extend of voice change, categorized by age and the specific type of consonant being analyzed. Initially, there were discrepancies in the length of consonant sounds and alterations in vocal characteristics that were influenced by age. Certain people had more pronounced variations in duration as they aged, whilst others did not demonstrate any discernible pattern. Furthermore, there was a wide range of variations in the duration of consonants [a.hat], [thə.liŋa], and [tə.thap]. Voiced aspirated consonants typically have a greater length in comparison to voiceless consonants. Thirdly, there is a change in voice in the initial words of the middle section. The duration of the sound transition from [t] to [th] is often shorter at the word-initial position compared to its occurrence in the middle of a word. This signifies a variation in the sound generation mechanism depending on the word's position inside the sentence. Put simply, the discovery revealed differences in the length of consonant sounds and vocal modifications depending on the age of the individuals involved. Certain participants exhibited a pattern of longer duration as they became older; hence, there were no uniform patterns observed across different age groups. Additional variables can also influence the length of the voice. Furthermore, the analysis of consonant duration differences reveals the presence of aspiration and voicing. Pronunciations such as [t hə.liŋa] and [tə.thap] typically have a longer duration compared to voiceless consonants like [a.hat]. It indicates that voiced aspirated consonants may entail greater intricacy in sound generation. The sound change on /t/ at the beginning and in the middle of the word, which results in the duration change from [t] to [th], is generally longer in the middle of the word compared to the change that occurs at the beginning of the word. This suggests that the alteration of the [t] sound to a [th] sound in the middle of a word may necessitate additional modifications during speech production. Furthermore, there exists a notable divergence among participants, even within the same age cohort, which is referred to as individual variability. These findings indicate that voice production is influenced by individual characteristics, such as speaking habits or anatomical diversity.

**CONCLUSION**

The findings of this research revealed that the participants exhibited devoicing, which refers to the absence of vowel vibration, when pronouncing the word 'Abdi'. The percentage of deviating devoicing was roughly 90%. Typically, the word 'Abdi' was intended to be spoken with a consonantal sound resonance of [ab.di]. Conversely, the participants articulated it without the phonetic resonance [ap.di]. In addition, the participants said the word [ʤa.wap] and encountered 40 occurrences of devoicing deviance during the reading assignment. The outcome yielded a deviation percentage of 100% in terms of devoicing. The participants produced the consonant [ʤa.wap] instead of [ʤa.wab] as indicated by the absence of sound vibration. Nevertheless, during the reading task, there were 16 occurrences of devoicing interference (deviation) noted when the participants articulated the word 'ear'. The subjects exhibited a devoicing deviation rate of 40%. This demonstrates that in certain instances, the participants articulated the consonant with an aspirated phonetic quality on [thə.liŋa], whereas in the majority of cases, they articulated it without any phonetic vibration [te.linga]. In addition, the individuals who articulated the word [tə.thap] also encountered 16 occurrences of devoicing deviance throughout the reading activity. The devoicing deviance had a 40% occurrence, mirroring the pattern observed in the subject who articulated the word [tə.thap]. Ultimately, the individual who articulated the term [a.hat] exhibited 40 occurrences of devoicing variation during the reading assignment, resulting in a devoicing rate of 100%. This

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