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An Exploration of Pronunciation Errors Among Bilingual Arabic-English Children (Ages 5-7)

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***Abstract*— In an increasingly globalized society, bilingualism has become a defining characteristic of modern identity, presenting unique phonological challenges for children navigating dual linguistic registers. While pronunciation errors are a natural and developmental stage of language acquisition, bilingual children often exhibit higher error rates than their monolingual peers due to the cognitive and physical complexities of mastering two sets of phonetic structures simultaneously. In the Kingdom of Bahrain, a notable shift toward English-medium instruction in private schools has increased early exposure to both Arabic and English. This educational landscape creates a unique environment where language dominance and exposure levels may significantly influence speech accuracy and communicative competence. This study investigates the specific pronunciation error patterns in the spontaneous speech of Bahraini bilingual Arabic-English children aged five to seven. The research addresses three primary questions: (1) What are the most common pronunciation error patterns observed in this demographic? (2) Do these children produce a higher frequency of errors in Arabic or English? and (3) To what extent does gender influence the distribution and type of these errors? Adopting a qualitative research design, the study utilized naturalistic, unstructured observation of six children (three boys and three girls) within their home environments. Spontaneous speech samples were recorded, phonetically transcribed, and analyzed using an Error Analysis (EA) framework. This framework was supplemented by a basic statistical analysis to determine error frequencies across languages and genders. The analysis identified thirty distinct mispronunciations, which were classified into four main categories: substitution, omission, addition, and suppletion. Substitution emerged as the most frequent error pattern among the participants. Notably, the findings revealed that subjects made significantly more errors in Arabic than in English, likely reflecting the pedagogical emphasis on English in private school settings. Furthermore, gendered disparities were observed: girls exhibited a higher frequency of English mispronunciations, whereas boys displayed more errors in Arabic. The significance of these findings lies in their challenge to traditional assumptions of native-language dominance; suggesting that intensive English-medium immersion in early childhood can lead to a "dominance shift" where the phonological accuracy of the mother tongue (Arabic) begins to lag behind the second language. By identifying that social interaction styles, such as gendered play patterns, directly correlate with language-specific errors, this study underscores that phonological development is as much a social process as it is a cognitive one. In terms of disciplinary connections, this research bridges Applied Studies and Education by providing empirical data for "Balanced Bilingualism." Within Applied Linguistics, it contributes to the study of phonetic interference and language attrition in Gulf-based bilingual contexts. For the field of Education, these insights are vital for curriculum designers in Bahrain, highlighting the need for restorative L1 (Arabic) phonetics support to ensure that high English proficiency does not result in the erosion of native language precision. Ultimately, the study provides a framework for targeted early intervention strategies that address both the linguistic and social variables of the bilingual classroom.**

Keywords—Bilingual, phonological error patterns, substitution, gender.

I. Introduction

As globalization continues to shape our world, bilingualism has become increasingly prevalent. While it offers numerous cognitive and social benefits, it also presents unique challenges for language learners. One such challenge is the acquisition of accurate speech and pronunciation in both languages. Speech, as defined by Merriam-Webster, is a form of communication or expression of thoughts in spoken words. Pronunciation plays a crucial part in speech as it shapes and navigates how and what we are trying to say is understood by the receiver. Accurate pronunciation can be challenging at times, especially for children who are learning to communicate their thoughts, ideas, wants, and needs in a meaningful way that adults would understand. Thus, bilingual children find it even more challenging as they have two registers (along with local dialects) that they are trying to master. To a certain degree, mispronunciations can lead to misunderstandings that can get in the way of communication. In child speech, many mispronunciations can be detected as they are still acquiring language, learning how certain sounds are formulated and pronounced within certain contexts and word structures. This is a common, natural, and a developmental aspect of language development. Numerous factors, such as individual differences, language exposure, cognitive development, and physical development, might contribute to these errors. In this modern day and age, private schools in Bahrain focus more on the English language rather than Arabic, teaching children courses mostly in English. Furthermore, most Bahraini children nowadays are exposed to both, Arabic and English, from a very young age which makes them prone to making more errors in both languages as some studies demonstrated that bilingual children exhibited higher error rates compared to monolingual children (Gildersleeve-Neumann et al., 2008). This research explores and analyzes the patterns of pronunciation errors among Bahraini bilingual Arabic-English children who are between the ages of five and seven. Omissions, substitutions, suppletions, and additions; are some common types of pronunciation errors in children.

A. Thesis Statement and Research Questions

Pronouncing words correctly can be difficult for children for various reasons. They may have trouble understanding how sounds relate to letters, or they might not be exposed to enough different ways of speaking. Pronunciation difficulties can also be a result of underlying issues like speech-language problems or hearing problems. Consonant clusters and a lack of phonological awareness are two particular difficulties. Additionally, dialectal differences may come into play since children may need to acquire standard pronunciations that are different from their local dialects.

This study aims to investigate the common patterns of pronunciation errors exhibited by bilingual Arabic-English children aged 5-7 and explore the factors that influence these errors, while also examining the impact of language dominance and gender influence on their pronunciation accuracy. In order to fulfill the purpose of this study, the following questions must be answered:

1. What are the common patterns of pronunciation errors among Bahraini bilingual Arabic-English children (ages 5-7)?
2. Is there a difference between the mispronunciations of the two languages (Arabic and English), and which language is more likely to have more pronunciation errors?
3. To what extent does gender play a role in the making of these pronunciation mistakes?

B. Significance of the Study

The significance of this research lies in its potential to shed light on the complex process of bilingual language acquisition, specifically focusing on the development of pronunciation skills in young bilingual children. By examining the specific challenges and strategies employed by bilingual Arabic-English children, this research can contribute to a deeper understanding of the factors that influence second language phonological development. Furthermore, the findings of this study may have practical implications for language education and intervention, informing the development of effective pedagogical approaches to support bilingual children's pronunciation skills. Ultimately, this research aims to advance knowledge of bilingualism and to improve language teaching and learning practices.

C. Methodology

For the purpose of this research, the qualitative data collection method of naturalistic observation was used as the main method for obtaining data. Six Bahraini bilingual Arabic-English children, ages five to seven, who attended private schools in Bahrain were shadowed to record and capture spontaneous speech as part of the data collection procedure. In order to identify and categorize the individuals'

pronunciation errors, the gathered speech samples were transcribed and subjected to an error analysis framework. The correlation between gender, language (English and Arabic), and error patterns was also determined using statistical analysis. In order to better assist young bilinguals in their language learning process, this investigation sought to offer insightful information about the factors that affect bilingual children's pronunciation development.

D. Layout and Organization

There are six chapters in this research report. The Literature Review, which follows the Introduction, examines the literature on gender-specific linguistic differences, phonological development and awareness in children, and error analysis of pronunciation accuracy. The Methodology chapter, which covers details on the techniques used for data gathering and analysis, comes next. Following the presentation of the research's findings in the Findings chapter, the Discussion chapter follows, where the findings are examined and contrasted with those of other relevant studies. Lastly, a thorough synopsis and overview of this research are provided in the Conclusion section.

II. Literature Review

An Overview

This research paper investigates the pronunciation errors that are exhibited in the speech of Bahraini bilingual Arabic-English children. Within the broader context of acquiring speech sounds in both Arabic and English, this section focuses on how phonological awareness affects bilingualism, as well as the impact of bilingualism on speech accuracy. It looks into how the accuracy of speech of bilinguals and their linguistic background(s) predicts pronunciation errors and patterns.

A. Phonological Development and Awareness

Alkali's (2018) study examined the relationship between phonological awareness (PA), reading, and spelling skills in bilingual Arabic-English speaking children in the UK. The research aimed to understand how PA skills in both languages influence literacy development in children ages 7, 8, and 9 years old. The study found a positive correlation between PA skills in both languages, suggesting that strong PA skills in one language can benefit the other. Additionally, the study revealed that PA skills were significantly related to both reading and spelling abilities in both languages. These findings highlight the importance of developing strong phonological awareness skills in bilingual children to support their literacy development in both languages. The development of self-regulation in early children's speech production was examined by MacDonald et al. (2012). The study investigated the ability of toddlers (ages 2-3) to modify their speech production in response to auditory input. Using real-time audio processing, the researchers adjusted the pitch of the children' vocalisations as they were playing. Following that, they observed the children's reactions to the changed pitch in their own voices. Despite the altered auditory feedback, the study discovered that toddlers could compensate for the pitch manipulations by changing their vocalisations to generate a pitch that was closer to their natural voice. This implies that self-regulation in speech production is present even in young infants.

B. Error Analysis of Speech Accuracy

Gildersleeve-Neumann et al. (2008) compared between English speech acquisition of monolingual English children (ages 3-4) to that of bilingual children with English-Spanish backgrounds. They hypothesized that exposure to Spanish would not affect the English phonetic inventory but would increase error frequency and type in bilingual children. Methodology included collecting single-word speech samples from 33 children from 3 different groups (monolingual English children, English–Spanish bilingual children who were predominantly exposed to English, and English–Spanish bilingual children with relatively equal exposure to English and Spanish). The data was then phonetically transcribed and compared for change over time for phonetic inventory, phoneme accuracy, and error pattern frequencies. Results included children with bilingualism and English exposure showed similar phonetic inventories, but higher error rates, especially for syllable-level error patterns. Some error patterns decreased across language groups, but significant differences were observed across groups. Vowel error rates did not differ by language group. Therefore, exposure to English and Spanish may increase English error rates in bilinguals, particularly preschool-aged children, but all groups will eventually reach an adult-like English system with exposure and practice.

Kieseier (2021) compared speech accuracy and pronunciation patterns between early learners of English as a foreign language with different language backgrounds. The aim of this study was to see if the linguistic background predicts pronunciation outcomes and if error sources and substitution patterns differ between monolinguals and heterogeneous bilinguals. The data was collected from 183 participants attending a German public primary school, through an English picture-naming task. Three independent raters transcribed productions, comparing monolingual and bilingual pronunciation accuracy, error types, frequency, and substitution patterns between different language groups using a linear mixed-effects regression analysis. After background factors (cognitive, linguistic, and social) were controlled for, bilinguals (irrespective of specific L1) significantly outperformed their monolingual peers on overall pronunciation accuracy. The most frequent error sources overlapped, affecting English sounds which are considered marked, are absent from the German phoneme inventory, or differ phonetically from a German equivalent; further highlighting that bilingual learners may deploy additional resources in the acquisition of target language phonology that should be addressed in the foreign language classroom.

C. Influence of L1 on L2 Pronunciation

Ben-Ammar's (2020) study investigates the production and perception of English stops and fricatives by Emirati Arabic bilinguals. The research aims to understand the challenges faced by these learners in acquiring and producing the /p/ and /v/

sounds, which are not present in Arabic. The study found that Emirati Arabic speakers often have difficulty perceiving and producing English stops and fricatives, particularly those that do not have corresponding sounds in Arabic. This difficulty is attributed to L1 interference and the lack of phonetic distinctions in Arabic. The findings of this study highlight the importance of targeted phonological training for Emirati Arabic learners of English. By addressing specific challenges in perception and production, it is possible to improve the overall English language proficiency of these learners.

A study by Wuwur and Subiyanto (2023) focused on the consonant pronunciation mistakes made by preschoolers learning English as a foreign language. Researchers observed the natural pronunciations of three Indonesian preschoolers in a reading education program that focused on showing how letters join to create the same sound, which requires three primary abilities: phonemic awareness, phonics, and letter-sound combination. They carried out this research by using a descriptive qualitative research methodology. The purpose of the study was to determine whether the pronunciation errors made by the students are phonological, to examine these errors using Schane's (1973) theory of distinguishing features, and to identify potential contributing factors. Seven different consonant sounds were found to be mispronounced by the participants. In their speech, the sound [tʃ] changed to [k], [dʒ] was replaced by [d], [θ] was pronounced as [t], [ʃ] changed to [s], and [v] was pronounced as [p]. Then, there was the addition of a [s] sound and a [z] sound when deletion occurs. Additionally, it was discovered that students frequently substitute or modify English consonant sounds as some of these sounds do not exist in Indonesian.

Another study published by Jabali and Abuzaid (2017) investigates the sounds that native Palestinian Arabic speakers mispronounce in English. Twenty undergraduate English students at An-Najah National University were recorded in order to identify the mispronounced consonant sounds. Through this study, the researchers aimed at identifying the English consonant sounds that Arab speakers find problematic, explaining the characteristics of these consonants and the natural class to which they belong, and providing advice to English language learners and instructors in order to mitigate future consonant pronunciation issues. It was found that /p/, /tʃ/, /dʒ/, /ɹ/, and /ŋ/ were determined to be difficult to pronounce by the participants. In light of these findings, the primary causes of the mispronunciation are that Arab Palestinian speakers of English do not sufficiently practice pronouncing words correctly, or if they do, the problematic sounds are not realized physically in the same way in the Arabic phonological system. Furthermore, researchers advise practicing consistently and listening to native speakers of the second language when learning the pronunciation of that second language.

D. Linguistic Gender Differences

Kaushanskaya et al. (2013) looked into the potential influence of gender on children's word acquisition. With an emphasis on the function of declarative memory, or long-term linguistic knowledge, in word learning, the study investigates whether girls and boys differ in their capacity to acquire new vocabulary. Children between the ages of five and seven were given new words that were either foreign (using sounds not often found in English) or phonologically familiar (using recognisable English phonemes). Additionally, they changed the referents (things) that went with the terms, utilising both known and unknown objects. According to the study, when new words were paired with familiar referents and had a phonological familiarity, girls outperformed boys in learning them. In addition, no significant gender differences were observed for unfamiliar words. This suggests that girls may rely more heavily on their existing linguistic knowledge to support word learning.

III. METHODOLOGY

An Overview

In this chapter, the methods of data collection and analysis are discussed, with the aim of examining whether the pronunciation errors are mostly committed in the subjects' mother-tongue, as well as exploring the common patterns and similarities of those mispronunciations, in regards to gender.

A. Participant Sample

The sample consisted of six children with their age ranging from five to seven years old. Three of those children are girls and the other three are boys. They all use both Arabic and English in their daily lives, inside and outside of their home environments, for communication. Further, they had been exposed to both languages from an early age, even before starting school. In addition, they all attend private schools, where the focus is more on the English language rather than Arabic.

B. Methods of Data Collection

Two methods were utilized for the collection of data regarding the pronunciation mistakes of

bilingual Arabic-English children ages 5 to 8 years old:

a. Naturalistic unstructured observation: A total of six (three boys and three girls) bilingual Arabic-English children ages five to seven years old were shadowed in their natural, home environment to capture spontaneous speech. The purpose of this is to be able to capture authentic language data, without interfering with the child's natural behavior, considering the social and cultural context of language use to identify certain patterns and sequences of mispronunciations.
b. Text analysis: phonetic transcription of the collected speech samples were analyzed for pronunciation errors, focusing more on identifying similar patterns of mispronounced words.

C. Methods of Data Analysis

To examine the pronunciation mistakes of Arabic-English bilingual children between the ages of five and seven years old, six children were observed using the qualitative research method via unstructured observation and ethnography, focusing on the similar mispronunciation patterns (in both Arabic and English) within the speech of these children. Recordings of the mispronunciations were phonetically transcribed for further analysis employing the following methods:

- Error analysis: Mispronounced words were recorded (upon given consent from the parents of the participants) and later on transcribed to identify patterns in participants' errors, such as consistent mispronunciations of certain sounds or sound sequences, categorize, and analyze these errors.
- Statistical analysis: Statistical methods, such as correlation, were used to identify relationships between error patterns and gender.

By using both qualitative and quantitative methods (with a bigger focus on qualitative), this study gained a more comprehensive understanding of error patterns, including their frequency and severity in bilingual Arabic-English children's speech.

IV. Findings

An Overview

The objective of this section is to provide the results of the error and statistical analysis carried out on the speech samples that were gathered from the six Bahraini bilingual Arabic-English children. Understanding and determining common patterns of pronunciation errors, identifying the language with the highest number of mispronunciations, along with discovering the variations among these languages' errors were the objectives of the research. Furthermore, the extent to which gender contributes to these mispronunciations was examined. The findings show the common patterns of these errors and how frequently the individuals mispronounced words in each language, pointing to both gender disparities and overall patterns.

A. Error Patterns in Mispronunciations

Thirty mispronunciations, in total, were identified from the collected speech samples of the participants. The mispronunciations were then categorized into four different categories; substitution, omission, addition, and suppletion. Substitution is the process of replacing one phoneme in a word with another as in the word for the number "three" pronounced as "free" - /fri:/. The removal of phonemes from a word is known as omission as exemplified in mispronouncing the word "outside" as "ouside" - /aʊsaɪd/. Adding an additional phoneme to a word is referred to as addition, such as "Ruyand" instead of "Ruyan" /rɒjand/. Finally, the term "suppletion" describes a word that has been completely changed, similar to saying "مشمن" /mɛʃmɪn/ when meaning "مش," the Bahraini Arabic verb for go.

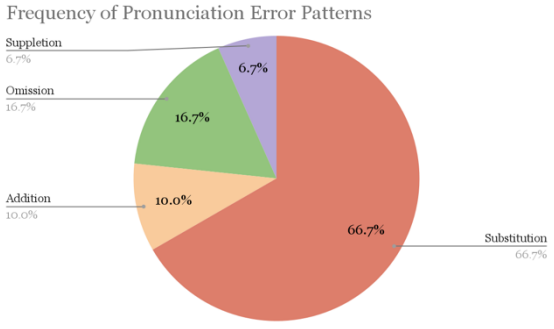

Fig. 1. The Frequency of Pronunciation Error Patterns in Collected Data.

The substitution pattern, which appears in 66.67% of the collected data, is the most common pattern, as seen in Figure 1. It is followed by omission, then addition, and the least often is suppletion.

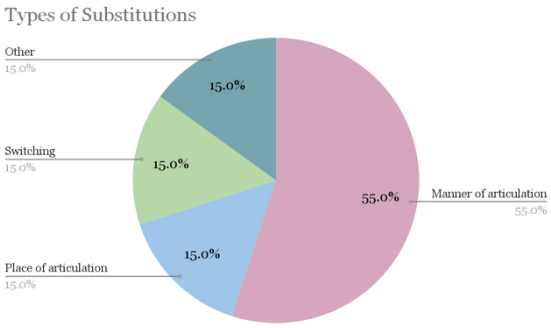

Fig. 2. Types of Substitution and Their Frequencies

Mispronunciations following the substitution pattern demonstrated four different types (subcategories) based on the manner of articulation, the place of articulation, the switching of sound placement, or other factors (such as over-extension and/or external influence). According to Figure 2, substitutions related to manner of articulation were the most prevalent in the pronunciation errors exhibited by the participants. Other types are equal in frequency.

TABLE I. Instances of Substitutions Based on Type from Data Collected.

Substitutions			
Type	***Correct Pronunciation***	***Mispronunciation***	***IPA Transcription of Mispronunciation***
Manner of Articulation (Plosives)	Bracelet	Bracelip	/ˈbreɪslɪp/
Manner of Articulation (Nasals)	نسينا	مسينا	/məsɛɪnə/
Manner of Articulation (Fricatives)	Three	Free	/fri:/
Manner of Articulation (Fricatives)	ثلاجة	فلاجة	/felædʒəh/

Place of Articulation (Velar)	قفشة	غفشة	/ˈɣafʃəh/
Switching the Placement of Sounds	عملية	علمية	/ʕɑlɑmiːjəh/
Other (influence/ over-extension)	Math	Map	/mɑp/

The table above provides examples, from collected data, for each type of substitution. Three instances in relation to manner of articulation were identified. The first being with plosive sounds (stops), in which the production requires a brief stopping of the airflow. An example of this is the word "bracelet," which was mispronounce as "bracelip" or /ˈbreɪslɪp/. In the pronunciation error, the final consonant /t/ was replaced with a /p/ sound, both of which are voiceless plosive sounds. The Bahraini Arabic word for spoon "قفشة" /gafʃəh/ was mispronounced as "غفشة" or /ˈɣafʃəh/, which represents the second type of substitution that is related to the place of articulation. In this example, the initial velar (sounds that are produced with the back part of the tongue against the soft palate or velum) consonant /g/ was substituted for a /ɣ/. Furthermore, some mispronunciations exhibited the substitution type where two sounds that exist in the word were switched. To exemplify this, the Arabic word for surgery "عملية" /ʕɑmɑliːjəh/ was mispronounced as "علمية" /ʕɑlɑmiːjəh/, as both the /m/ and /l/ sounds exist in the original word but in the mispronunciation their placement was reversed. The last example in the table is related to the "other" type of substitution, where the mispronunciation might have been due to external influence or an over-extension. The final consonant /θ/ was replaced with a /p/ sound.

TABLE II. EXAMPLES OF OMISSION.

Omissions		
Correct Pronunciation	***Mispronunciation***	***IPA Transcription of Mispronunciation***
Difficult	Difficul	/ˈdɪfɪkəl/
Outside	Ouside	/aʊˈsaɪd/
Clothes	Close	/kləʊz/
January	Janury	/ˈdʒænjʊrɪ/

Table II demonstrates some examples of pronunciation errors following the omission pattern. Most of the examples show that omission occurs mostly with consonant sounds as in the word "difficult" mispronounced as "difficul" /ˈdɪfɪkəl/, where the final consonant /t/ was elided. Another instance of elision is with the word "clothes" where the consonant /ð/ was omitted from the middle of the word, mispronouncing it as "close" /kləʊz/.

TABLE III. INSTANCES OF ADDITION.

Addition		
Correct Pronunciation	***Mispronunciation***	***IPA Transcription of Mispronunciation***
Memory	Membory	/mɛmbɔːrɪ/
Ruyan	Ruyand	/rɒˈjand/
سبتمبر	سمبتمبر	/sembˈtembər/

The majority of extra sound additions are consonants, according to the examples of pronunciation errors that follow the addition pattern in the table above. The mispronunciation of the word "memory" as "membory" /mɛmbɔːrɪ/ is a good example of this, as the voiced bilabial consonant /b/ was added to the word after the second voiced bilabial /m/ sound.

TABLE IV. EXAMPLES FOLLOWING THE SUPPLETION PATTERN.

SUPPLETION		
Correct Pronunciation	***Mispronunciation***	***IPA Transcription of Mispronunciation***
موعد	وعود	/wʊʕʊːd/
مش	مشمن	/mɛʃmɪn/

This preceding table shows the very few instances of pronunciation errors that follow the pattern of suppletion. This refers to complete

distortion of the original word as in the mispronunciation of the Bahraini Arabic word "مش" as "مشمن" /mɛʃmɪn/, where it is almost unrecognizable as a real word.

B. Arabic VS. English

Of the identified mispronunciations, Arabic and English mispronunciations were analysed in terms of frequency.

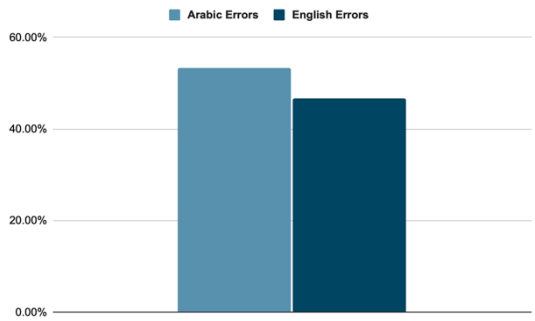

Fig. 3. Frequency of Arabic Mispronunciations Compared to English Mispronunciations.

Figure 3 shows that participants' pronunciation errors in Arabic were somewhat higher than those committed in English. The percentage of Arabic errors was approximately 53.33%, whereas the percentage of English errors was at around 46.67%, making the difference between them about 6.66%.

TABLE V. PRONUNCIATION ERRORS IN ARABIC FROM COLLECTED DATA.

Arabic Mispronunciations			
Type of Pronunciation Error	***Correct Pronunciation***	***Mispronunciation***	***IPA Transcription of Mispronunciation***
Substitution (manner of articulation / nasals)	وعود	/wʊʕʊːd/	/məsɛɪnə/
Substitution (manner of articulation / nasals)	مشمن	/mɛʃmɪn/	/məfs/
Substitution (manner of articulation / fricatives)	فلاجة	ثلاجة	/felædʒəh/
Substitution (place of articulation / velar)	غفشة	قفشة	/ɣafʃəh/
Suppletion	مشمن	مش	/mɛʃmɪn/
Substitution (switching of sounds)	مليس	ميلس (مجلس)	/meljɪs/
Addition (place of articulation / bilabials)	سمبتمبر	سبتمبر	/sembˈtembər/
Substitution (over-extension)	ديايق	دقايق	/dɪjɑːjəg/
Substitution / switching sounds	حاشنة	شاحنة	/ħɑːʃɪnəh/
Suppletion / over-extension	وعود	موعد	/wʊʕʊːd/
Substitution (switching sounds)	علمية	عملية	/ʕɑlɑmiːjəh/
Substitution (place of articulation / glottal)	طائرة	طاهرة	/tˤɑːʔɪrəh/
Substitution (manner of articulation / fricatives)	سمس	شمس	/sɑms/
Substitution (manner of articulation / fricatives)	سجلة	شجرة	/sɛdʒɑləh/
Substitution (manner of articulation / fricatives)	احاف	اخاف	/ʔɑħɑːf/

The majority of mispronunciations adhere to the substitution pattern, as seen in table 5. There are not many examples that adhere to the addition and suppletion patterns. The pattern of omission is not followed in Arabic mispronunciations from the collected data.

TABLE VI. PRONUNCIATION ERRORS IN ENGLISH FROM COLLECTED DATA.

English Misronunciations			
Type of Pronunciation Error	***Correct Pronunciation***	***Mispronunciation***	***IPA Transcription of Mispronunciation***
Substitution (manner of articulation / plosives)	Bracelet	Bracelip	/ˈbreɪslɪp/
Addition (place of articulation / alveolar)	Ruyan	Ruyand	/rɒjand/
Addition (place of articulation / bilabials)	Memory	Membory	/mɛmbɔːrɪ/
Substitution (influence / over-extension)	Math	Map	/mɑp/
Omission	Outside	Ouside	/aʊsaɪd/
Substitution (close place of articulation / interdental and fricative)	Together	Togeder	/təˈgedər/
Substitution (manner of articulation / fricatives)	Three	Free	/friː/
Omission	Clothes	Close	/kləʊz/
Omission	January	Janury	/ˈdʒænjʊrɪ/
Omission	Difficult	Difficul	/ˈdɪfɪkəl/
Substitution (manner of articulation / nasals)	Museum	Museun	/mjuːˈzɪən/
Substitution (manner of articulation / nasals)	Niki	Mickey	/ˈmɪkɪ/
Substitution (close place of articulation / interdental and fricative)	There	Dere	/der/

As demonstrated through table VI, most of the pronunciation errors follow the pattern of substitution. Followed by omission. And then addition, with the least amount. There are no instances of suppletion exhibited in the errors produced in English.

C. Linguistic Gender Differences

The findings are discussed in this section with regard to linguistic gender differences, noting that various genders have distinct pronunciation error patterns and other linguistic distinctions.

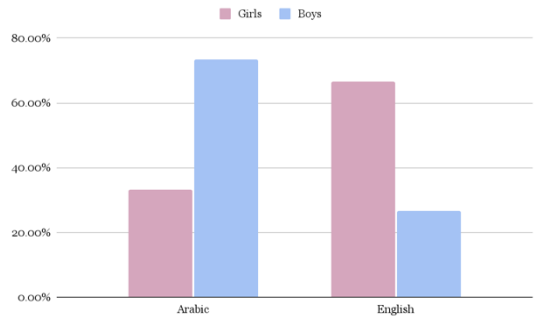

Fig. 4. Frequency of Pronunciation Errors in Arabic and English in regards to Gender.

The gender-based disparities in pronunciation errors between Arabic and English are depicted in the preceding graphic. It can be shown that while English pronunciation errors were more common among girls, Arabic mispronunciations were more common among boys.

TABLE VII.

TABLE VII. PRONUNCIATION ERRORS EXHIBITED BY GIRLS.

Pronunciation Errors Made by Girls			
Type of Pronunciation Error	***Correct Pronunciation***	***Mispronunciation***	***IPA Transcription of Mispronunciation***
Substitution (manner of articulation / plosives)	Bracelet	Bracelip	/ˈbreɪslɪp/
Addition (place of articulation / alveolar)	Ruyan	Ruyand	/rɒjand/
Addition (place of articulation / bilabials)	Memory	Membory	/mɛmbɔːrɪ/
Substitution (influence / over-extension)	Math	Map	/mɑp/
Substitution (manner of articulation / nasals)	نسينا	مسينا	/məsɛɪnə/
Substitution (manner of articulation / nasals)	نفس	مفس	/məfs/
Omission (phonetic feature)	Outside	Ouside	/aʊsaɪd/
Substitution	Together	togeder	/təˈgedər/
Substitution (manner of articulation / fricatives)	Three	Free	/friː/
Substitution + addition (manner of articulation / fricatives)	ثلاجة	فِلاجة	/fɪlædʒəh/
Omission	Clothes	Close	/kləʊz/
Omission	January	Janury	/ˈdʒænjʊrɪ/
Substitution (place of articulation / velar)	قفشة	غفشة	/ɣafʃəh/

According to this table, all Arabic mispronunciations exhibited by the girl subjects follow the pattern of substitution. Whereas with English pronunciation errors, they follow patterns of substitution, omission, and addition. No instances of suppletion found in the girls' data.

TABLE VIII. PRONUNCIATION ERRORS EXHIBITED BY BOYS.

Pronunciation Errors Made by Boyls			
Type of Pronunciation Error	***Correct Pronunciation***	***Mispronunciation***	***IPA Transcription of Mispronunciation***
Omission	Difficult	Difficul	/ˈdɪfɪkəl/
Substitution (manner of articulation / nasals)	Museum	Museun	/mjuːˈzɪən/
Suppletion	مش	مشمن	/mɛʃmɪn/
Substitution (switching of sounds)	ميلس (مجلس)	مليس	/meljɪs/
Addition (place of articulation / bilabials)	سبتمبر	سمبتمبر	/sembˈtembər/
Substitution (manner of articulation / nasals)	Niki	Mickey	/ˈmɪkɪ/
Substitution (over-extension)	دقايق	دايق	/dɪjɑːjəg/
Substitution / switching sounds	شاحنة	حاشنة	/ħɑːʃɪnəh/
Suppletion	موعد	وعود	/wʊʕʊːd/
Substitution (switching sounds)	عملية	علمية	/ʕɑlɑmiːjəh/
Substitution (place of articulation / glottal)	طاهرة	طائرة	/tˤɑːʔɪrəh/
Substitution (manner of articulation / fricatives)	شمس	سمس	/sɑms/
Substitution (manner of articulation / fricatives)	شجرة	سجلة	/sɛdʒɑləh/

As seen in table VIII, the Arabic mispronunciations exhibited by boys follow multiple patterns, such as substitution, addition and suppletion. While English mispronunciations follow the substitution and omission pattern.

i. Twin Differences

Among the participants in this research, two pairs of twins (one pair of two girls and the other consisting of a boy and a girl) were shadowed.

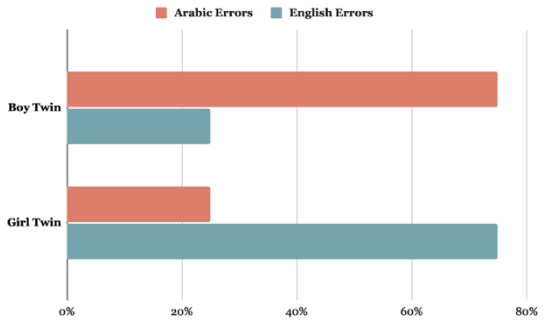

Fig. 5. Frequency of Mispronunciations of the Boy-Girl Twins in Arabic and English.

The figure above displays the percentages of pronunciation errors made by the boy-girl twins in both Arabic and English. As can be observed, the girl twin mispronounced more words in English, whereas the boy twin exhibited more pronunciation errors in Arabic. Despite being together, growing up in the same home environment, going to the same school, and interacting with one another, the boy-girl twins continued to adhere to their gender differences. This further highlights the role that gender differences play in pronunciation errors.

V. Discussions

In order to improve language teaching and learning practices, advance knowledge of bilingualism, and inform the development of effective pedagogical approaches to support bilingual children's pronunciation skills, the primary objective of this study was to investigate the various patterns of pronunciation errors among Bahraini bilingual Arabic-English children. The study examined common pronunciation error patterns, focusing on their frequency in each language and how gender affects the making of these mispronunciations (as indicated in tables I-IV and figures 1-4).

The research findings align to a certain extent with a prior study conducted by Kieseier (2021), in that substitution is the most common error pattern among bilingual children, where primarily consonant phonemes are substituted with a similar phoneme that shares some sort of phonetic feature(s) with the original, as per the previous tables. However, there were no instances of cross linguistic influence of L1 on L2 pronunciation as suggested by Kiesier (2021) and Wuwur and Subiyanto (2023), instead the findings revealed that Arabic mispronunciations were higher than the English ones by 6.66%.

While this study's findings (somewhat) align with previous research in identifying substitution as a common error type, it highlighted types of substitutions for the mispronunciations uncovering possible reasons as to why these pronunciation errors occur. Most substitution errors might be due to the tendency of how children are unable to correctly pronounce certain sounds in certain phonetic contexts, such as phoneme order/structure. Another factor can be dialectal influence, where local dialects influence these errors, as demonstrated in the mispronunciation of the Arabic word "ثلاجة" mispronounced as "فلاجة" /felædʒəh/, where in some local Bahraini dialects the /θ/ is often replaced with a /f/. Likewise, addition is done due to perceptual difficulties, where the child misperceives sounds based on a similarity between the added sound and the sound that occurs before or after the added sounds. A great example that demonstrates this is the word "memory," where the child added a /b/ (voiced, bilabial, stop) sound after the voiced, bilabial, nasal sound /m/ mispronouncing it as "membory" /mɛmbɔːrɪ/. Moreover, omission is often a simplification strategy used by children as they learn to produce complex sounds, syllable structures, and consonant clusters, easing articulation especially in fast-paced speech. Additionally, suppletion is a normal process when it comes to language acquisition as some children might completely change a word (Raising Children Network, 2021; PARADIS et al., 2010).

Gender differences in language were also noted through the findings of this research that demonstrate the tendency of boys in making more pronunciation errors in Arabic whereas with girls, English errors were more frequent. This reflects the different socialization ways of the two genders as girls were found to engage and interact more in Arabic with parents and family members, while boys demonstrate their level of comfort in using English more in communicating with friends. This might be explained through the way children play as well and how adults surrounding them interact with them as when boys play with action toys, they do not actually produce words rather they produce sounds that these toys might make. In response to this the adult might engage with producing similar sounds which does not actually expose the child to language input. Girls, on the other hand, enjoy playing pretend, where they pretend to be teachers for example which requires them to actually produce speech. The adults here would contribute with actual words, exposing the child to language input (Eriksson et al., 2011;Kaushanskaya et al., 2013).

VI. Conclusion

This study has delved into the intricate process of phonological development in bilingual Arabic-English children aged 5–7, revealing a significant "dominance shift" within the Bahraini socio-educational context. The findings demonstrate that while bilingualism is a hallmark of modern Bahraini identity, current educational trends favor English phonetic mastery at the expense of native Arabic accuracy, evidenced by the higher frequency of errors in Arabic (53.33%) compared to English (46.67%). These results suggest that language dominance and exposure levels, specifically within English-medium instruction, are not merely influential factors but are primary drivers of phonetic attrition in the primary language (L1).

To achieve a framework of balanced bilingualism, it is imperative that pedagogical interventions move toward "restorative L1 phonetics support." Educators and language specialists must develop targeted strategies that address the specific phonological patterns identified in this research, such as substitution and omission, while accounting for the gendered disparities observed in error distribution. By refining these pedagogical frameworks, future generations can be ansured to attain global English proficiency without sacrificing native Arabic mastery. Future research should explore the long-term efficacy of cross-linguistic phonetic awareness programs and the role of digital tools in maintaining bilingual phonological equilibrium in increasingly globalized contexts.

Limitations

Although this study offers valuable insights into the relationship between phonological development and pronunciation errors of bilingual Arabic-English children, it is important to acknowledge some limitations. Due to the relatively small sample size, it may be difficult for the findings to be generalized to a broader cohort of bilingual children. Additionally, the study relied heavily on observation to capture speech and error analysis to assess pronunciation accuracy, which may not capture the full range of phonological challenges faced by bilingual children. Furthermore, due to the cross-sectional nature of the study, developmental trajectory analysis is not possible. Future research may benefit from a larger sample size, a more diverse range of assessment tools, and a longitudinal design to gain a deeper understanding of the factors influencing bilingual phonological development.

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APPENDIX

Appendix I. Mispronunciations of Girl #1 (5 years old / girl twin - pair A)

Language	***Correct Pronunciation***	***Mispronunciation***	***Type of Pronunciation Error***	***IPA Transcription of Mispronunciation***
English	Bracelet	Bracelip	Substitution (manner of articulation / plosives)	/ˈbreɪslɪp/
English	Ruyan	Ruyand	Addition (place of articulation / alveolar)	/rɒjand/
English	Memory	Membory	Addition (place of articulation / bilabials)	/mɛmbɔːrɪ/
Engli	Math	Map	Substitu	/mɑp/

sh			tion (influence / over-extension)	
Arabic	نسينا	مسينا	Substitution (manner of articulation / nasals)	/məsɛɪnə/
Arabic	نفس	مفس	Substitution (manner of articulation / nasals)	/məfs/

Appendix II. Mispronunciations of Girl #2 (5 years old / girl twin - pair A)

Language	***Correct Pronunciation***	***Mispronunciation***	***Type of Pronunciation Error***	***IPA Transciption of Mispronunciation***
English	Outside	Ouside	Omission (phonetic feature)	/aʊsaɪd/
English	Together	togeder	Substitution	/təˈgedər/
English	Three	Free	Substitution (manner of articulation / fricatives)	/friː/
Arabic	نسينا	مسينا	Substitution (manner of articulation/nasals + phonetic features)	/məsɛɪnə/
Arabic	ثلاجة	فلاجة	Substitution (manner of articulation / fricatives)	/felædʒəh/

Appendix III. Mispronunciations of Girl #3 (7 years old / girl twin - pair B)

Language	***Correct Pronunciation***	***Mispronunciation***	***Type of Pronunciation Error***	***IPA Transciption of Mispronunciation***
English	Clothes	Close	Omission	/kləʊz/
English	January	Janury	Omission	/ˈdʒænjʊrɪ/
English	Onion	Onon	Omission	/ˈʌnʌn/
Arabic	قفشة	غفشة	Substitution (place of articulation / velar)	/ɣafʃəh/

Appendix IV. Mispronunciations of Boy #1 (6 years old)

Language	***Correct Pronunciation***	***Mispronunciation***	***Type of Pronunciation Error***	***IPA Transciption of Mispronunciation***
English	Difficult	Difficul	Omission	/kləʊz/
English	Museum	Museun	Substitution (manner of articulation / nasals)	/mjuːˈzɪən/
Arabic	مش	مشمن	Suppletion	/mɛʃmɪn/

Arabic	ميلس (مجلس)	مليس	Substitution (switching of sounds)	/meljɪs/
Arabic	سبتمبر	سمبتمبر	Addition (place of articulation / bilabials)	/sembˈtembər/

Appendix V. Mispronunciations of Boy #2 (6 years old)

Language	***Correct Pronunciation***	***Mispronunciation***	***Type of Pronunciation Error***	***IPA Transcription of Mispronunciation***
English	Niki	Mickey	Substitution (manner of articulation / nasals)	/ˈmɪkɪ/
Arabic	دقايق	دايق	Substitution (over-extension)	/dɪjɑːjəg/
Arabic	شاحنة	حاشنة	Substitution / switching sounds	/ħɑːʃɪnəh/
Arabic	موعد	وعود	Suppletion	/wʊʕʊːd/
Arabic	عملية	علمية	Substitution (switching sounds)	/ʕɑlɑmiːjəh/
Arabic	طاهرة	طائرة	Substitution (place of articulat	/tˤɑːʔɪrəh/
			ion / glottal)	

Appendix VI. Mispronunciations of Boy #3 (7 years old / boy twin - pair B)

Language	***Correct Pronunciation***	***Mispronunciation***	***Type of Pronunciation Error***	***IPA Transcription of Mispronunciation***
English	There	Dere	Substitution	/der/
Arabic	شمس	سمس	Substitution (manner of articulation / fricatives)	/sɑms/
Arabic	شجرة	سجلة	Substitution (manner of articulation / fricatives)	/sɛdʒɑləh/
Arabic	اخاف	احاف	Substitution (manner of articulation / fricatives)	/ʔɑħɑːf/