

## ORTHOGRAPHIC-PHONETIC INTERFACE: RECOGNITION OF SCHWA /ə/ AT DIGRAPHIC WORD-FINAL POSITION

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### ABSTRACT

This study embarks on investigating the complex interface between the phonological representation of the schwa /ə/ and its corresponding orthographic form at word final digraphic position. The researchers intend to expound the perception and recognition of vowel-letter harmony of /ə/ of English as L2 in Pakistani context. The students enrolled in BS English program at the department of English, University of Narowal, Pakistan, formed the cohort of the study for data collection. Quantitative analysis of the data revealed important insights. The participants correctly perceived and recognized 73% words with digraph *or* and 74% with digraph *er*. However, the percentage of correct perception and recognition of *ar* digraph o vowel sound was 61%. These findings provide important empirical evidence for examining sound-letter interfaces that particularly highlighting the complexity English vowel system particularly vowel sound. The findings of this study stand to enrich our understanding of the interplay between sound and script, contributing to linguistic knowledge, and offer insights for language pedagogy and language learning.

**Keywords:** Schwa, word final position, digraph, Pakistani English

### INTRODUCTION

The term 'schwa' has a long history spanning from German name of a vowel of central quality found in Hebrew (Crystal, 2008; Ladefoged & Johnson, 2011). Many German words are formed with the root morpheme 'schwa' (e.g. schwach, schwank, and schwanken) meaning "weak", "varying" and "unstable" respectively. The schwa symbol ⟨ə⟩ was included in the draft version of the IPA in 1887 and it became part of all of its official versions onwards. In the field of phonetics, schwa (/jwa:/) is a mid central vowel sound produced when the lips, tongue, and jaw are completely relaxed. Surprisingly, schwa is the most common vowel sound in spoken English (Knight, 2012; Yule, 1996) that often causes spelling mistakes in its orthographic form. As a phonological phenomenon, the vowel /ə/ can be realized by different allophones subject to the variation in the speaker and the nature of the adjoining sounds. That's why Jones (1960) and Styler (2023) propose that the term 'schwa' may be used for some unstressed and toneless neutral vowel, not necessarily mid central, as it is often used to represent reduced vowels in general.

In Received Pronunciation, schwa /ə/ is generally produced as a reduced vowel in unstressed environments where the quality of vowels diminishes in terms of duration or clearness. The primary purpose of schwa, therefore, is to allow unstressed syllables to be uttered more quickly so that the main beats of spoken words are easier to place on the stressed syllable. It is a reduced vowel in many unstressed syllables especially if syllabic consonants are not used. Depending on dialect, it may be articulated for the orthographic forms of the letters: ⟨a⟩, ⟨e⟩, ⟨i⟩, ⟨o⟩, ⟨u⟩, ⟨y⟩, and surprisingly unwritten, as in word *rhythm* [ˈɪðəm]. Contrary to RP English where /ə/ is traditionally treated as a weak vowel that may occur only in unstressed syllables, in some General American accents, schwa is considered to occur in stressed syllables merged with /ʌ/. This specification of schwa in stressed or unstressed syllables is found in various dictionaries of English. *Longman Pronunciation Dictionary* and the *Cambridge English Pronouncing Dictionary* use ⟨ʌ⟩ to represent what may be analyzed as a stressed schwa produced in American English (Wells, 2000). Dictionaries that

use symbol ⟨ə⟩ for schwa regardless of whether it is stressed or unstressed include the *Merriam-Webster Collegiate Dictionary*, the *Oxford English Dictionary*, and the *Routledge Dictionary of Pronunciation for Current English*.

In diagraphic word final position, schwa sound corresponds to three digraphs ⟨ar⟩, ⟨er⟩, and ⟨or⟩ in English. The schwa sound produced in such digraphic context is non-rhotacized in British English contrary to rhotacized accents of English such as American English. However, the articulation of one vowel sound in three different digraphic forms is enigmatic and perplexing for non-native speakers of English who exclusively on the spellings of words for pronunciation. This enigma has led the present researchers to investigate how the non-native speakers of English map schwa sound with its orthographic variants at word final position in English.

### 1. Literature Review

The complexity of the realization of schwa has been consistently chased by researchers. Flemming and Johnson (2007) concentrated on finding significant phonetic differences between schwa vowels at word-final position, and schwa vowels at medial positions. Their data reflected that word-final schwa has a relatively consistent vowel quality (i.e. mid central), while word-internal schwa is relatively high and varies contextually in backness and lip position. The words selected for reading for word final schwa were Rosa, sofa, and umbrella produced by 09 female speakers of American English. However, word-medial schwa in di-syllabic and tri-syllabic words like suggest, today, probable were recorded. The researchers argue that the variability results from assimilation of schwa to the surrounding context. Schwa with lowest F2 is found in word medial position (probable [pɹɪəbəl]) probably due to assimilation to previous back vowel [ɑ] and the succeeding velarized lateral. Similarly, lips constriction can be linked to assimilation to the labial closures of the preceding and succeeding stops. Palato-alveolar context causes higher F2 values of schwa (e.g. suggest [sədʒɛst]). However, they established that the variability of non-final schwa functions systematically and in controlled way.

Kondo (1994) explored schwa variation in the English indefinite article *a*, in phrases as ‘pick a kite’ taking data from the speakers of RP English in an experimental study. She systematically varied the

preceding and following consonants and vowels in the phrase. The resulting variation was measured in the formant frequencies of schwa. The analysis mirrored that variation in F2 of schwa was largely consistent with the assimilation hypothesis.

Indrayani and Nugraha (2020) conducted research on the speakers of Muna language (a Malaysian language) as their L1 to find out their patterns of English schwa having quality of mid-central short vowel. Noticeably, Muna language has only five vowels without varying long and short vowels contrary to Received Pronunciation and General American English. The participants’ readings of various words containing schwa sound in sentences were recorded. The data gained by the researchers were acoustically analyzed by Praat. The findings showed that the participants either tried to relate the words containing schwa to certain vowel in Muna Language considering as a close equivalent of English mid-central short vowel (schwa) or eliminated the sound to avoid mispronouncing English schwa absent in Muna Language. The findings of the study have implications for teaching English as second language to the speakers of those languages which do not have mid-central vowel/schwa in their phonetic system. This study highlights the significance of associating vowel phonemes to the actual words in target language particularly for the learners of L2 where such vowel phonemes are absent in their first language to enhance their realization of English schwa in actual words.

Shahid, Shabbir, and Aslam (2023) recently focused on Pakistani contexts for observing the perception and realization of schwa by the Pakistani learners of English as second language. They collected data from various schools by giving them a list of 20 allophonic words starting with letter ‘A’. The participants were directed to sift the words focusing on the schwa sound in Sort-out Test and afterwards read out those words loudly in Pronunciation Test. They came up with the findings that 39% of students were placed at poor position (securing grading marks ranging from 01 to 10), 26% learners were graded good (securing grading marks ranging from 11 to 15), and 36% were assigned excellent (securing grading marks ranging from 16 to 17). The analysis of the sorts-out test claimed for higher performance of female learners than that of the male learners. In Pronunciation Test, 44% students were graded poor, 32% percent were assigned good, and 24 % were

assigned excellent. In total, the female learners achieved 62% of the marks, while the boys obtained only 38% marks. This study is significant for giving a new dimension of gender specificity to acquisition of schwa which can be lend a helpful hand to pedagogical and learning continuum in second language learning.

The relationship between speech sounds and orthography has been a critical topic of investigation (Read, 2004; Treiman, 2018). The researchers (Lee, 2013; García-Priest & Martínez-Sanz, 2018; Gentry, 2007; Choi et al., 2012) empirically witnessed that phonological features often influence the choice of letter/grapheme in different languages. This correspondence between textual manifestations and their phonetic features warrant investigation in Pakistani English known for its phonological distinctiveness from standard British English particularly in case of vowels (Rahman, 1997). The analysis of this correspondence between phonetic features of schwa and its orthographic structure is commendable as the phonetic system of Urdu and English language are divergent from each other. Hence, this study intends to explore whether the Pakistani learners of English feel at ease in mapping phonetic features and orthographic form of schwa or they are confused in digraphic word final position due to varying features of schwa sound in their L1.

**2. Research Methodology:**

**3.1 Research Design**

The study employs a quantitative research method to inspect the recognition of schwa /ə/ sound in the words containing digraph "or", "er", "ar" at word final position. As quantitative research method emphasizes on objective measurements and statistical analysis of data using computational techniques (Babbie, 2010; Dornyei, 2007), this study focuses on gathering data on learners' recognition of schwa /ə/ in numerical form and generalizing the findings across the target population to explain the particular phenomenon of schwa /ə/ in English phonology. Moreover, this study is descriptive in nature as it aims at describing the prevalent phenomenon of /ə/ at diagraphic word-final position in educational institutes in Pakistan systematically which is the hallmark of descriptive design "used to identify problems with current practice, justify current practice, make judgments, or determine what

others in similar situations are doing" (Grove et al. 2013, p. 215).

**3.2. Sample**

The students of BS from English Department at University of Narowal, Narowal are included in the study for collection of data. The sample comprises of 30 participants from 6<sup>th</sup> semester. Their age ranged from 19 to 20 years. The background of the participants is mostly rural with Punjabi and Urdu as their L1.

**2.3. Ethical consideration:**

Prior to data collection, formal approval was obtained from the Head of the Department. Informed consent was acquired from all the participants. Participants were assured of confidentiality and the right to withdraw from the study any time.

**2.4. Stimuli:**

The participants were provided with an audio of the following words ending with *or*, *er*, *ar* correlated with non-rhotic schwa. The list contained 07 words with each type of digraph summing up to 21 words in total. The key challenge was to perceive schwa sound and translate it into writing. The audio was based on Received Pronunciation. The participants were required to listen the audio carefully and produce the words orthographically.

Table 3.1: List of the words provided to the participants in audio form as stimuli

Sr #	Digraph 'or'	Digraph 'er'	Digraph 'ar'
1	Instructor	Manufacturer	Collar
2	Predictor	Composer	Lunar
3	Investigator	Organizer	Solar
4	Distributor	Stemmer	Cigar
5	Constructor	Surrender	Altar
6	Supervisor	Wander	Seminar
7	Connector	Treasurer	Guitar

**Data Analysis:**

The stimuli of 21 words elicited data of 630 (30\*21=630) words ending with digraph *or*, *er*, and *ar*. The words with each digraph were 210 (30\*7=210) to see whether the participants were able to map the orthographic and phonetic representations/forms of schwa /ə/ at word final position accurately or not. The important point considered for analysis is the focus of the researchers

just on the orthographic form of digraphs *or*, *er*, and *ar* in words leaving the remaining spellings of the words unconsidered. The data were analyzed in terms of calculating the frequency and percentage of the words accurately mapped by the respondents.

**Results:**

The analysis of the data reflects that the participants successfully mapped orthographic and phonetic forms of 157 words out of 210 words ending with *er*. Likewise, 155 words out of 210 words having digraph *or* at final position were accurately perceived and recognized. In contrast, the frequency of the words ending with the digraph *ar* was 130 out of 210 words successfully mapped in the data. The results of the study suggest that the learners feel more difficulty in mapping orthographic and phonetic form of the words containing digraph *ar* at word final position than the words containing digraph *or* or *er* at word final position.

**Table 3.2: Frequency and Percentage of the words with correct recognition of /ə/**

Rate of correct Recognition	Digraph <i>or</i>	Digraph <i>er</i>	Digraph <i>ar</i>	Total
Frequency	155	157	130	442/630
Percentage	73%	74%	61%	70%

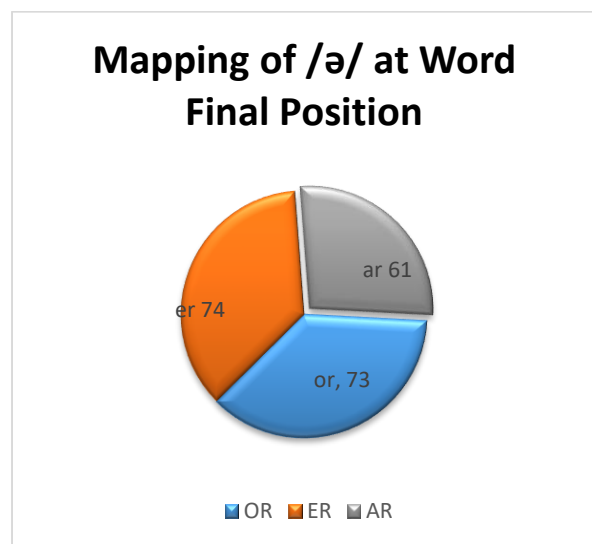


Figure 3.1. Ratio of correct mapping of /ə/ to is digraph variants at word final position

**3. Discussion:**

The results of the present study provide valuable insights into the complex phenomenon of perception and realization of schwa in various diagraphic contexts. This study is an empirical query into the correspondence between the phonological realization and orthography of the schwa sound in digraph *or*, *er*, and *ar* at word final position. The data analysis reflects range of delicacy of bond between orthographic form and phonetic realization of schwa sound in various digraphic contexts. This range can be associated to phonetic complexity of English phoneme /ə/ representing to different rather sometimes conflicting orthographic forms. The study shows that the learners feel at ease in correlating schwa with *or* and *er* at word final position. However, the intriguing correlation of schwa with its orthographic form *ar* at word final position indicates the complex nature of schwa in *ar* context which leads to various interpretations. This complexity can be linked to the L1 background of the participants of the study. As it was mentioned in the Methodology section that the participants have Urdu background where the ‘ar’ can be produced as a rhotic open back vowel at word final position just as the words /lɔhɑ:r/, /əʃɑ:r/, /beika:r/ words in Urdu. Their background knowledge interfered in the correct mapping of schwa with its orthographic form *ar* at word final position. However, this interference was curtailed in the contexts of *er* and *or* digraphs. The varying frequency/percentage of accurate vowel perception and recognition yearns for focusing on the phonological complexities unique to learners of Pakistani English. The findings of the central vowel /ə/ underscore the need for diagnosing phonological phenomenon pervading in Pakistani English commending pertinent pedagogical techniques for English vowels particularly schwa.

**4. Conclusion:**

This study focuses on the complex interaction of phonetic realization of schwa sound and its orthographic form in English. The data in lexical form shed light on the complexities involved in matching phonological nuances with orthographic form and contribute to the understanding of linguistic phenomenon in Pakistani English. The study shows that the Pakistani learners of English feel at ease in correlating schwa with diagraph *or* and *er* at word final position. However, weak correlation of schwa with its orthographic form *ar* at word final position

in the data indicates the complex nature of schwa in *ar* context which leads to various interpretations. This result can be linked to absence of one to one relationship between English orthographic and phonological system due to which learners of English as L2 do not feel at comfort in identifying schwa successfully in varying digraphic contexts particularly *ar*. This misidentification of schwa in *ar* contexts at word final position might be due to influence of L1 (Urdu) of the learners where *ar* diagraph is associated with a rhotic open back vowel as /ɑ/. Based on the findings, it is established that the learners successfully recognize and map schwa sound with diagraph *or* and *er* but they are not certain about the phonetic realization of *ar* as schwa /ə/ at word final position.

**5.1. Implications:** Understanding how speakers/learners perceive and associate phonological changes in texts is important for both language and pedagogical practice in local linguistic context of Pakistani English. Teachers and the curriculum developers can benefit from these insights to develop targeted interventions that help students overcome the challenges posed by orthographic variations related to "schwa" in English. In light of the limited research on this unique phonetic-orthographic interface in the Pakistani English context, the findings of this study stand to enrich our understanding of the interplay between sound and script, contribute to linguistic knowledge, and offer insights for language pedagogy and teaching instruction.

**5.2. Delimitations:** It is important to acknowledge some delimitations of this study. The data were collected from the students of the English Department, which may not adequately represent the dialects of Pakistani English speakers. Future research could include a wider variety of participants and investigate more factors such as age, gender, education level, location, profession etc. that may influence the perception/recognition of the phoneme "schwa" in varying contexts in English as second or foreign language.

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