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Perception of Linking, Assimilation, and Elision by Saudi EFL Students

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Abstract

Linking, assimilation, and elision are key features of connected speech that facilitate natural communication in English. However, they receive limited attention in EFL instruction, particularly in Arab contexts where written forms are prioritised. Limited exposure to natural speech and reduced forms leads Saudi male learners to struggle with listening comprehension. This study investigated Saudi male university students' perceptions of connected speech features at the University of Prince Mugrin using a background questionnaire, dictation tests, and ABX discrimination tests, with participants purposively selected in line with the institution's gender-segregation policy. It specifically addressed how Saudi students at the University of Prince Mugrin perceive the connected speech features of assimilation, elision, and linking. The study adopted quantitative and qualitative methods to evaluate perceptual sensitivity across these three targeted features. Thirty pre-intermediate learners, identified through the institutional placement test, participated in controlled classroom-based data collection. The results revealed that linking was the most difficult to perceive, followed by assimilation, while elision was perceived most accurately. The findings indicate that learners rely on contextual cues and lexical familiarity rather than phonological decoding, with performance shaped by L1 influence, cognitive load, and limited exposure to natural speech. The study

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concludes that explicit instruction and increased exposure to authentic input can enhance Saudi EFL learners' perception of connected speech.

Keywords: Assimilation, connected speech, elision, learning opportunities, linking.

1. INTRODUCTION

In second language acquisition, learners often struggle to process natural spoken input, particularly when speech contains reduced forms characteristic of connected speech (Carney, 2025; Fitriani, 2024; Mulder et al., 2024; Omar & Pilus, 2022; Wong et al., 2017). Connected speech refers to phonological adjustments that happen at word boundaries, such as linking, assimilation, and elision. These adjustments facilitate fluency and naturalness in spoken English (Celce-Murcia et al., 2010). Despite their importance, English teachers often ignore these features, particularly in Arab contexts where written forms are prioritised, and pronunciation is commonly taught in isolation (Bi et al., 2022; Omar & Pilus, 2022).

For Saudi EFL students, the perception of connected speech features poses a challenge in understanding what is being said. Students who perform well in reading and grammar face challenges when they encounter informal spoken English in which words are reduced, blended, or modified. Research conducted in Arab contexts shows that these challenges arise because English connected speech contains phonological patterns that differ from those found in Arabic. Linking, for instance, becomes difficult because Arabic does not employ consonant-to-vowel resyllabification and typically inserts a glottal stop before vowel-initial words, which results in students misinterpreting linked sounds such as 'olive oil' (AlQbailat et al., 2024; Omar & Pilus, 2022). Assimilation also creates difficulties for speakers, particularly for fricative and nasal changes that have no direct equivalents in Arabic. Studies indicate that Arab learners face challenges in identifying the /z/ → /ʒ/ sound, such as in 'those yellow', and nasal assimilation in sequences like 'ran back' (Alteyp, 2023; Benmezal & Bensemmane, 2022). Elision is likewise difficult for Arab learners because English /t/ and /d/ deletions disrupt the stable structure of Arabic syllables, while /h/-elision in pronouns (e.g., 'ask her') is unfamiliar and often missed in listening (Ali et al., 2021; Ibrahim, 2016; Omar, 2022). This underscores the need to examine how Saudi learners perceive specific features of connected speech.

Although international research on connected speech has expanded in recent years, studies examining Arab learners' perceptual processing of specific connected speech features remain limited. Within the Saudi EFL context, existing research has largely focused on general listening skills or instructional approaches, with insufficient attention to learners' ability to detect and process individual phenomena such as linking, assimilation, and elision (Al Qunayeer, 2020; Omar & Pilus, 2022). As a result, the perceptual mechanisms underlying listening difficulty remain underexplored.

In Saudi higher education, gender segregation shapes research access because male and female students are taught on separate campuses. Consequently, participants are usually drawn from just one gender, depending on which group is accessible within the institution. Numerous studies have focused exclusively on male participants (e.g., AlMohaya et al., 2025; Altamimi, 2025), while others have examined only female samples (e.g., Alhaysony, 2012; Almogheerah, 2021). Consistent with these prior studies and institutional limitations, the present study centres on Saudi male university learners.

To address this gap, the present study investigates Saudi male university students' perception of three connected speech features: linking, assimilation, and elision, using two complementary perceptual tasks: a dictation test and an ABX discrimination test. Dictation and ABX tasks offer complementary insights into connected speech perception. Dictation reflects the processing demands of authentic listening, whereas ABX isolates perceptual discrimination in controlled conditions. The present study therefore employs both measures to obtain a more comprehensive understanding of how Saudi learners perceive linking, assimilation, and elision. By examining performance across features and task types, the study clarifies how Saudi learners

process reduced speech forms and explores the factors underlying learners' performance, including phonological salience, L1 influence, and cognitive load. The study therefore asks "How do Saudi male students at the University of Prince Mugrin perceive linking, assimilation, and elision in connected speech?"

More specifically, it investigates Saudi male EFL learners' perceptual sensitivity to these connected speech features and compares learners' performance on dictation and ABX discrimination tasks. By providing feature-specific empirical evidence from an Arabic-speaking EFL context, this study contributes to research on L2 speech perception and connected speech processing. Its findings are expected to highlight the need for explicit instruction and increased exposure to natural spoken input to better support Saudi learners' listening comprehension and communicative competence.

2. LITERATURE REVIEW

2.1 Connected Speech: Definitions and Aspects

2.1.1 Definition

Connected speech refers to the natural flow of spoken language, involving modifications, omissions, and boundary connections that improve rhythm and efficiency. The processes of linking, assimilation, and elision fall under this category (Celce-Murcia et al., 2010). Despite their prevalence, many L2 learners, particularly Arab learners, struggle with these features because of limited exposure to authentic speech and an emphasis on isolated pronunciation. In some contexts, connected speech is perceived as informal or 'sloppy' (Brown & Kondo-Brown, 2006), which contributes to its exclusion from teaching. However, explicit instruction has been shown to enhance intelligibility (Mahdi et al., 2024). Integrating connected-speech features into pronunciation instruction may therefore help learners develop more natural, fluent, and intelligible spoken English.

2.1.2 Linking

Linking connects sounds across word boundaries, creating smoother and more natural speech. It typically occurs in consonant-to-vowel (C-V), consonant-to-consonant (C-C), and vowel-to-vowel (V-V) environments (Beňuš, 2021; Reed & Levis, 2015). This study focuses on C-V and C-C linking with identical consonants, which are perceptually salient and pedagogically relevant for Saudi learners. Previous studies have shown that linking difficulties reduce intelligibility among bilinguals and Arab learners (Alhendi & Baniamer, 2024; AlQbailat et al., 2024).

2.1.3 Assimilation

Assimilation occurs when one sound changes under the influence of a neighbouring sound, often improving fluency (Celce-Murcia et al., 2010). Regressive assimilation is the most common, as in 'good girl' → [gʊg gɜ:l]. Arab learners face challenges with assimilation because similar patterns do not exist in their L1. For example, Algerian learners demonstrated restricted perception of assimilation (Benmezal & Bensemmane, 2022), while certain contexts involving nasal and lateral sounds further complicate comprehension (Alteyp, 2023).

2.1.4 Elision

Elision refers to omitting sounds, especially in rapid or casual speech (Celce-Murcia et al., 2010). Typical cases include dropping /t/ or /d/ before consonants ('left behind' → [lef bi'hænd]) or deleting /h/ in pronouns ('ask her' → [æskə]). Arab learners often misperceive elided forms

due to L1 syllable constraints (Ibrahim, 2016). Although some learners can recognise elided forms, accurate production often lags (Ali et al., 2021). Research into elision in Arab EFL pedagogy remains limited.

2.2 Perception of Connected Speech

Perception of connected speech poses a challenge for second language (L2) listeners because connected speech processes (CSPs), such as linking, assimilation, and elision, modify canonical word forms. These modifications increase the difficulty of identifying segmental cues required for word recognition in natural speech (Celce-Murcia et al., 2010; Reed & Levis, 2015). Research shows that reduced forms are harder to perceive than full speech, particularly for lower- and intermediate-proficiency learners. Processes such as resyllabification, consonant weakening, and segment deletion delay lexical access and increase error rates in listening tasks (Kul, 2024; Rost, 2016). As a result, L2 learners use top-down processing to make inferences from context and predict words rather than performing full phonological decoding (Wong et al., 2021). While these strategies may support global comprehension, they become less effective when students lack access to relevant background information or when multiple reduction patterns occur simultaneously.

For Arabic-speaking learners, these perceptual challenges are compounded by cross-linguistic phonological differences. Arabic does not employ consonant-to-vowel resyllabification, allows limited consonant clustering, and restricts segment deletion, resulting in speech patterns that differ from English connected speech (Omar, 2022). Consequently, English CSPs present students with sound patterns that differ from those in their native language, leading them to frequently misidentify sounds. Studies in Arab EFL contexts show difficulty perceiving linked boundaries, assimilated segments, and elided consonants that occur in rapid or informal speech (Benmezal & Bensemmame, 2022; Ibrahim, 2016; Omar & Pilus, 2022).

Despite these findings, much existing research treats connected speech as a single construct or evaluates listening comprehension holistically. Such approaches obscure potential differences in perceptual difficulty across CSPs and make it difficult to determine whether learners' success reflects genuine phonological processing or contextual guessing. This limits theoretical precision and pedagogical applicability. The present study addresses this gap by examining the perception of linking, assimilation, and elision separately using two complementary perceptual tasks. Dictation captures learners' ability to process reduced forms under real-time listening conditions, where phonological decoding interacts with cognitive load. In contrast, the ABX discrimination task isolates perceptual sensitivity by minimising linguistic and cognitive demands. This combined approach enables a precise assessment of Saudi EFL learners' perceptual difficulties and addresses calls to integrate controlled and ecologically valid measures in L2 speech perception research (Felker et al., 2019; Ke & Wang, 2021).

2.3 Assessing Connected Speech Perception

Dictation tests and ABX tests are among the most widely used and reliable methods for assessing connected speech perception. Dictation has been employed to examine how reduced forms affect L2 listening comprehension (Henrichsen, 1984; Reed & Levis, 2015), while ABX tasks are a well-established method for measuring perceptual sensitivity in phonological research (Dupoux et al., 1999). Their consistent use in L2 studies underscores their validity for investigating how learners perceive reduced speech.

2.3.1 Dictation tests

Dictation tests are commonly used to assess learners' ability to recognise reduced forms in real-time listening (Felker et al., 2019). Research consistently shows that non-native listeners perform significantly worse when reductions such as linking, assimilation, or elision occur

(Henrichsen, 1984; Ito, 2006), whereas native speakers' scores remain stable. Reduced forms obscure critical phonetic cues, making word recognition more demanding (Reed & Levis, 2015).

Scholars state that dictation tasks need careful design to accurately measure perceptual decoding abilities. Joyce (2013), for example, recommends using short, decontextualised sentences to minimise contextual guessing and ensure that performance reflects bottom-up processing. Although dictation is sensitive to cognitive load, it continues to serve as an effective method to measure how L2 listeners handle listening difficulties when they encounter real-life speech in their environment.

2.3.2 ABX discrimination tasks

The ABX paradigm assesses precise perceptual abilities by presenting three stimuli (A, B, X) and asking listeners whether X matches A or B. The ABX paradigm works best for low-proficiency learners because it does not require listeners to identify words, use their knowledge of written language, or think about language rules. The method has proven effective in phonological studies investigating vowel epenthesis (Dupoux et al., 1999) and tone perception (Wayland & Guion, 2003). In connected speech research, ABX tasks enable researchers to assess learners' sensitivity to specific phonetic contrasts, such as assimilated or linked segments, without the additional cognitive demands of real-time segmentation or memory.

3. METHODS

3.1 Research Design

This study adopted a quantitative descriptive design, supplemented by qualitative analysis (Barroga et al., 2023; Johnson & Christensen, 2019), to examine Saudi EFL learners' perceptions of three connected speech features: linking, assimilation, and elision. Data were collected using two perceptual tasks, a dictation test and an ABX discrimination test, together with a background questionnaire. The two tasks were combined so perception could be assessed under both the real-time processing demands of transcription and the reduced cognitive load of controlled discrimination.

3.2 Participants

The participants were thirty male Saudi university students enrolled in the Preparatory Year Program at the University of Prince Mugrin. A purposive sampling strategy was adopted, as access to the male campus was restricted in accordance with the gender-segregation regulations governing Saudi higher-education institutions. These institutional barriers restricted recruitment to male students; therefore, a purposive approach was the most feasible and appropriate method for obtaining a homogeneous sample with shared sociolinguistic backgrounds. Such sampling is commonly used in Saudi EFL studies where researchers are limited to one gender due to institutional policies (Alnasser, 2022).

All participants were pre-intermediate learners of English, as determined by their official placement results from the university's English Placement Test. Only students whose scores fell within the university's designated pre-intermediate proficiency band were included. This proficiency level was intentionally targeted because learners at this stage have acquired basic phonological and lexical knowledge but are still developing the perceptual skills required to process reduced speech forms. All participants were native Arabic speakers aged 17–24 years ($M = 19$, $SD = 1.76$).

Only male students were included due to cultural and institutional regulations requiring gender segregation in Saudi universities. As a male researcher, access to the female campus is strictly prohibited, making it impossible to recruit female participants. Beyond these institutional constraints, limiting the sample to one gender also enhances methodological consistency. This

approach aligns with common practice in Saudi EFL research, where studies often focus on single-gender cohorts due to national policies governing campus access. None of the participants reported any health, sensory, or cognitive impairments.

3.3 Ethical Considerations

The study adhered to all applicable ethical standards for human subjects research. Prior to data collection, all students received written and verbal explanations of the study's objectives, procedures, and their rights as participants. Informed consent was obtained from each participant, and they were assured that participation was voluntary and would not affect their academic standing. Ethical approval for the study was granted by the Research Ethics Committee of Universiti Malaya (UM.TNC2/UMREC_3281). Formal permission to collect data from students was obtained from the Head of Department and the Dean at the University of Prince Mughrin following written and verbal requests. All data were handled with strict confidentiality, and participants' identities were anonymised to protect privacy and personal information.

3.4 Instruments

3.4.1 Background questionnaire (supporting instrument)

A background questionnaire was administered to collect both demographic and linguistic information and to document learners' self-reported familiarity with connected speech features. The questionnaire consisted of two sections with 20 items. The first section contained 10 demographic items, including age, nationality, first language, years of English study, and any exposure to native English-speaking environments. The second section comprised 10 Likert-scale items designed to elicit students' self-reported use and perception of connected speech features, rated on a five-point scale (strongly agree to strongly disagree).

The questionnaire was adapted from commonly used background information sheets in second language acquisition (SLA) research and modified to suit the Saudi EFL context. The questionnaire served as a supplementary tool for describing participants and did not assess the research variables, so no reliability assessment was needed. Its primary purpose was to characterise the participant group and ensure sample homogeneity.

3.4.2 Dictation test

The first perception task was a dictation test, widely recognised as an effective instrument for assessing connected speech perception (Felker et al., 2019). Participants transcribed 15 sentences containing instances of linking, assimilation, and elision, selected from 'Mastering the American Accent' (Mojsin, 2016), 'English Pronunciation in Use: Advanced' (Hewings, 2007), and 'American Accent Training' (Cook, 2017). A male native English speaker with extensive experience in pronunciation teaching recorded all sentences and was instructed to read them naturally and fluently. Items were intentionally kept simple and familiar to suit pre-intermediate learners. Content validity was carried out through expert evaluation by five experts in applied linguistics and ELT. The experts confirmed that all test items were suitable for the students' language abilities and accurately represented the targeted connected-speech features. The experts reached a high level of agreement (92% average across linguistic suitability, phonological appropriateness, and clarity), thereby confirming the entire set of items. Responses were scored dichotomously (1 = correct, 0 = incorrect) to facilitate statistical analysis.

Before administering the test to the main sample, a pilot study was conducted with six pre-intermediate Saudi EFL students, who were not included in the final sample. The pilot aimed to evaluate recording clarity, sentence difficulty, inter-item timing, and task-instruction clarity. Minor adjustments were implemented, including extending the pause between sentences to one minute and re-recording two sentences to ensure naturalness and intelligibility. Feedback from

participants confirmed that the sentence length, vocabulary load, and pacing were appropriate for the target proficiency level, supporting the instrument's suitability for full-scale administration.

The dictation test consisted of 15 sentences distributed evenly across the three connected speech features examined in this study. The first five items targeted linking. Items 6-10 focused on assimilation. The final five items (11-15) assessed learners' perception of elision. This balanced distribution ensured each connected speech feature was adequately represented, allowing meaningful comparisons of learners' perceptual performance across features.

3.4.3 ABX discrimination test

The second instrument was an ABX discrimination test designed to measure learners' ability to distinguish between minimally different auditory tokens without relying on written cues. Each trial consisted of three stimuli (A, B, and X), and learners indicated whether X was identical to A or to B, allowing a controlled assessment of their perception of linking, assimilation, and elision. To develop the stimuli, a pool of phrases representing natural contexts for the three connected-speech features was compiled. From this pool, 30 phrases (10 per feature) were selected based on their familiarity and suitability for pre-intermediate learners. For each phrase, two versions were created: a careful citation-form token and a natural connected-speech token in which the target feature occurred spontaneously. The same male native English speaker recorded all items in a quiet room using Audacity and a high-quality microphone. Unclear or inconsistent tokens were re-recorded, and each A-B pair differed only in the presence or absence of the connected-speech process, with X being an exact repetition of either A or B.

A panel of five faculty members at the University of Prince Mugrin specialising in applied linguistics, SLA, and ELT reviewed the content validity of the ABX items. Their feedback led to refining, replacing, and modifying several items to ensure clarity, linguistic appropriateness, and accurate representation of the target features. A pilot test was then conducted with a small group of pre-intermediate Saudi learners to assess the clarity of the instructions, the perceptual distinctiveness of the contrasts, and the feasibility of the task. Based on feedback from the pilot participants, further improvements were made, including simplifying the instructions, improving the quality of the stimulus recordings, modifying the item order, and adjusting the breaks between trials.

The final ABX test contained 90 trials (30 per feature), arranged in a pseudo-random order with a fixed 500 ms interval between A, B, and X. The test was administered using the researcher's laptop and high-quality external speakers in a quiet classroom, allowing all learners to hear the stimuli under the same conditions. No written prompts were provided, and participants marked 'A' or 'B' on a printed answer sheet. Responses were scored dichotomously (1 = correct, 0 = incorrect) for subsequent analysis.

3.5 Procedures

Data collection followed a standardised sequence to ensure consistency across participants and full compliance with ethical guidelines. At the beginning of each session, participants received verbal and written explanations of the study's purpose and procedures. They were reminded that participation was voluntary and that their responses would remain confidential. Written informed consent was obtained, and each participant was assigned an anonymised identification code for use throughout data collection and analysis.

Participants first completed the background questionnaire individually under the first researcher's supervision. The questionnaire collected demographic information and self-reported awareness of connected speech features. Once completed, participants proceeded immediately to the dictation task. The dictation test was administered in a quiet classroom using a laptop connected to external speakers to ensure consistent audio quality. Participants listened to fifteen recorded sentences containing instances of linking, assimilation, and elision. Each sentence was played three times consecutively, and no additional repetitions or pauses were permitted.

Participants transcribed their responses on prepared answer sheets, while the researcher monitored the session to maintain optimal listening conditions.

Following a short break, the ABX discrimination test was administered. Two practice trials familiarised participants with the task format. Participants listened to a series of auditory triads (A, B, and X) representing the three target features. They indicated whether stimulus X matched A or B by marking their responses on a printed answer sheet. The stimuli were presented using the same audio equipment as the dictation task to ensure acoustic consistency. Brief pauses were provided between feature sets to reduce fatigue. All tasks were administered by the researcher under controlled classroom conditions. The full data collection session was completed within a single sitting.

3.6 Data Analysis

Data were analysed using SPSS (Version 27), and all analytical procedures aligned directly with the study's research objective, which aimed to examine learners' perceptions of the connected speech features: linking, assimilation, and elision. To address this objective, quantitative accuracy scores from both the dictation and ABX discrimination tests were entered into SPSS. Frequencies and percentages were calculated to describe the distribution of correct responses. Descriptive statistics (means and standard deviations) were also used to summarise learners' perceptual performance for each feature across the two tasks.

To further evaluate the quality of the test items and ensure robust interpretation of the results, item difficulty and discrimination indices were computed for all dictation and ABX items. To classify item performance, difficulty and discrimination levels were determined using established criteria. Difficulty levels followed standard item-analysis thresholds in which scores of 20% or below were considered extremely difficult, scores between 21% and 40% were classified as moderately difficult, scores between 41% and 60% represented an average difficulty level, scores between 61% and 80% indicated fairly easy or easy items, and scores of 81% or higher were identified as very easy or extremely easy. Discrimination values were interpreted using [Ebel's \(1979\)](#) guidelines, whereby indices of 40 or above reflected very good discrimination, values from 30 to 39 indicated adequate discrimination, indices between 20 and 29 represented weak discrimination, and values below 20 were classified as very weak discrimination. The internal reliability of the instruments was examined using Cronbach's alpha, while content validity was assessed using item-total correlations calculated based on Pearson's correlation coefficient. This procedure examined how strongly each item correlated with the total test score, thereby indicating the extent to which each item measured the intended construct. Items with positive and statistically meaningful correlations were interpreted as valid indicators of their respective connected-speech features.

In addition to these statistical measures, a qualitative interpretation of sentence-level performance was conducted to identify underlying patterns in learners' responses. This qualitative analysis involved systematically reviewing learners' written responses in the dictation test to identify recurrent error types and perceptual confusions. Errors were categorised according to phonetic characteristics, such as misperception of resyllabification in linking, failure to detect place assimilation, and omission or misidentification of elided consonants. The identified patterns were also interpreted in relation to possible L1 transfer effects, lexical familiarity, and learners' instructional exposure. These categories emerged through iterative comparison across items and features, enabling identification of consistent perceptual tendencies and feature-specific challenges.

4. RESULTS

The dictation test and ABX discrimination test were used to assess learners' perception of linking, assimilation, and elision. The study reports quantitative results descriptively using means, percentages, and difficulty and discrimination indices. The subsequent sections present

detailed dictation and ABX results for each connected-speech feature, with tables and figures illustrating accuracy patterns, item difficulty, and discrimination indices.

4.1 Overview of Perceptual Performance Across Features

The learners' performance on the dictation and ABX discrimination tests across the three connected-speech features of linking, assimilation, and elision was analysed descriptively using accuracy percentages, means, difficulty indices, and discrimination indices. As shown in Table 1, the learners achieved an overall mean accuracy of 73.78% in the dictation test and 92.78% in the ABX discrimination test. The 19-point gap between the two tasks indicates that learners performed considerably better when required to discriminate between auditory tokens than when required to transcribe them.

Table 1. Overall accuracy in the dictation test and ABX discrimination test.

Instrument	Number of items	Mean accuracy (%)
Dictation Test	15	73.78%
ABX Discrimination Test	90	92.78%

Across the three features, elision showed the highest accuracy values in both tasks, followed by assimilation, while linking demonstrated the lowest accuracy. This pattern was consistent in both the dictation and ABX results.

4.2 Perception of Linking

Table 2 summarises performance on the dictation items targeting linking. Accuracy scores ranged widely, from 20% to 96.67% across the five items. The highest accuracy was recorded for 'The tickets have been sold out' (96.67%) and 'Whose friend has a big garden?' (93.33%), both classified as very easy based on their difficulty indices. In contrast, 'Olive oil makes food nice' recorded the lowest accuracy (20%), placing it in the difficult category. The remaining items, 'He wants to buy an amazing house' (50%) and 'Please hold on a minute' (60%), fell within the average difficulty range. The overall mean accuracy for linking items on the dictation test was 63.33%, with a corresponding difficulty index of 36%. Discrimination values for individual items varied: 'He wants to buy an amazing house' demonstrated very good discrimination (54.30), whereas 'Please hold on a minute' showed weak discrimination (27.70). The overall discrimination index for the linking set was 38.80, classified as adequate.

Table 2. Descriptive statistics, difficulty indices, and discrimination indices for linking items using the dictation test.

Sentence	Correct answers		Mean	Std. Dev.	Difficulty	Difficulty level	Discrimination	Discrimination level
	Freq.	%						
1- The tickets have been sold out.	29	96.67%	0.967	0.183	3.33%	Extremely easy	34.10	Adequate discrimination
2- Olive oil makes food nice.	6	20.00%	0.200	0.407	80.00%	Extremely difficult	32.00	Adequate discrimination
3- He wants to buy an amazing house.	15	50.00%	0.500	0.509	50.00%	Average difficulty	54.30	Very good discrimination
4- Please hold on a minute.	18	60.00%	0.600	0.498	40.00%	Average difficulty	27.70	Weak discrimination

Table 2 continued...

5- Whose friend has a big garden?	28	93.33%	0.933	0.254	6.67%	Extremely easy	46.10	Very good discrimination
Overall average	19	63.33%	0.569	0.368	36.00%	Average difficulty	38.80	Adequate discrimination

Figure 1 presents the distribution of accuracy, difficulty, and discrimination values for the dictation items. The figure illustrates item-by-item variation and the relative spread of performance across the five sentences. Items with higher accuracy generally corresponded to lower difficulty indices, while those with mid-range accuracy demonstrated greater variability in discrimination.

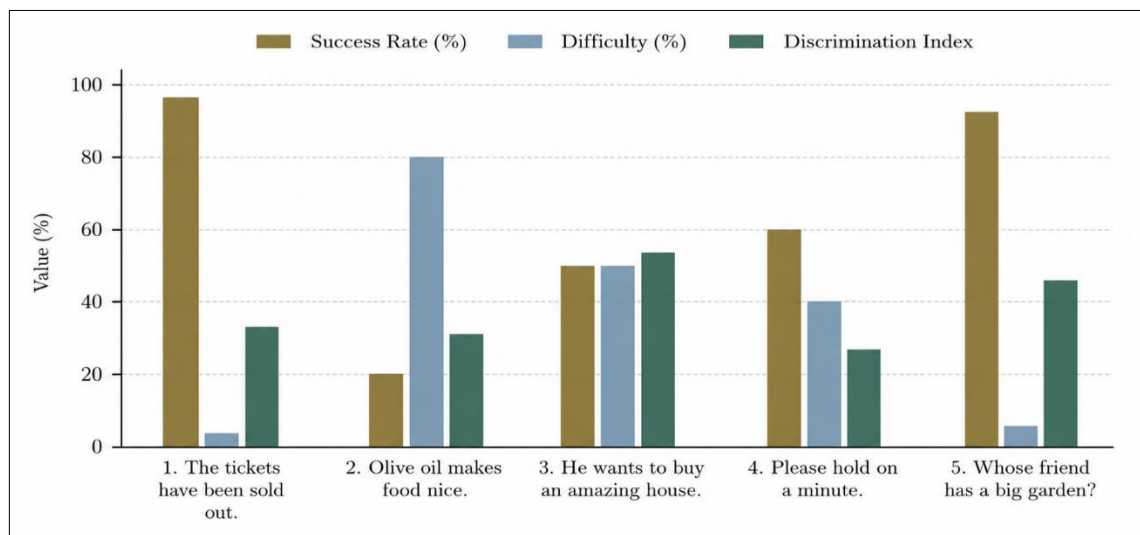


Figure 1. Feature analysis of linking items.

Results from the ABX discrimination test for linking are shown in Figure 2. Accuracy scores were consistently high across all 10 ABX items, with most scores ranging from 95% to 100%. Difficulty values for these items were correspondingly low. Discrimination indices displayed variation, with some items showing stronger differentiation among learners than others. Overall, the ABX linking results showed little variation in accuracy because most items had a high proportion of correct responses.

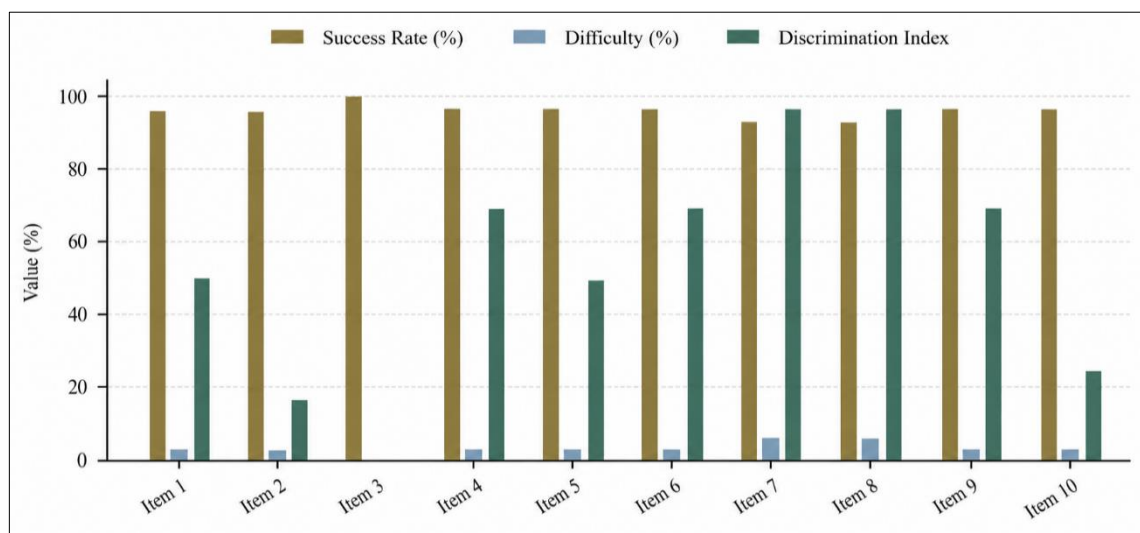


Figure 2. ABX linking test: Item comparison.

4.3 Perception of Assimilation

Table 3 summarises performance on the assimilation items in the dictation test. Accuracy scores ranged from 26.67% to 83.33% across the five items. The highest accuracy was recorded for ‘I’ll get you something to eat’ and ‘Wait here until I get back’ (both 83.33%), and these items were classified as easy based on their difficulty indices. In contrast, ‘Those yellow flowers are beautiful’ showed the lowest accuracy (26.67%), placing it in the moderately difficult category. The remaining two items, ‘I can lend you my car’ (60%) and ‘She ran back to the house’ (36.67%), fell within the average difficulty range. The overall mean accuracy for assimilation items on the dictation test was 74.66%, with a corresponding difficulty index of 42%. Discrimination values varied across items, with ‘Wait here until I get back’ showing very good discrimination (73.80), whereas ‘I can lend you my car’ and ‘She ran back to the house’ demonstrated adequate discrimination (33.50). The overall discrimination index for the assimilation set was 47.00, classified as adequate.

Table 3. Descriptive statistics, difficulty indices, and discrimination indices for assimilation items using the dictation test.

Sentence	Correct answers		Mean	Std. Dev.	Difficulty	Difficulty level	Discrimination	Discrimination level
	Freq.	%						
6- I’ll get you something to eat.	25	83.33%	0.833	0.379	16.67%	Easy	44.70	Very good discrimination
7- Those yellow flowers are beautiful.	8	26.67%	0.267	0.450	73.33%	Extremely difficult	49.50	Very good discrimination
8- Wait here until I get back.	25	83.33%	0.833	0.379	16.67%	Easy	73.80	Very good discrimination
9- I can lend you my car.	18	60.00%	0.600	0.498	40.00%	Average difficulty	33.50	Adequate discrimination
10- She ran back to the house.	11	36.67%	0.367	0.490	63.33%	Moderate difficulty	33.50	Adequate discrimination
Overall average	17	56.00%	0.580	0.439	42.00%	Average difficulty	47.00	Very good discrimination

Figure 3 illustrates the distribution of accuracy, difficulty, and discrimination values for the dictation items. The figure shows clear item-by-item variation, with higher-accuracy items corresponding to lower difficulty indices and greater spread observed among items with mid-range or lower accuracy. Discrimination values differed across items, indicating variation in the extent to which individual sentences distinguished stronger from weaker performers. The pattern suggests that certain items were more effective in capturing differences in learner performance, while others provided limited separation due to their level of difficulty. These variations indicate the influence of individual item characteristics on overall test performance.

Meanwhile, Figure 4 shows the results from the ABX discrimination test for assimilation are presented in Figure 4. Accuracy scores were consistently high across all items, with an overall mean of 92.33%. Difficulty indices were low, reflecting the high success rate across items. Discrimination values varied, although several items approached ceiling performance, reducing differentiation among learners. Overall, the ABX assimilation results showed little variation in accuracy because of the high proportion of correct responses across items. This indicates that most participants successfully identified the assimilation patterns tested in the ABX task. The limited variation across items suggests that the test items were relatively easy for the participants, resulting in reduced variability in performance.

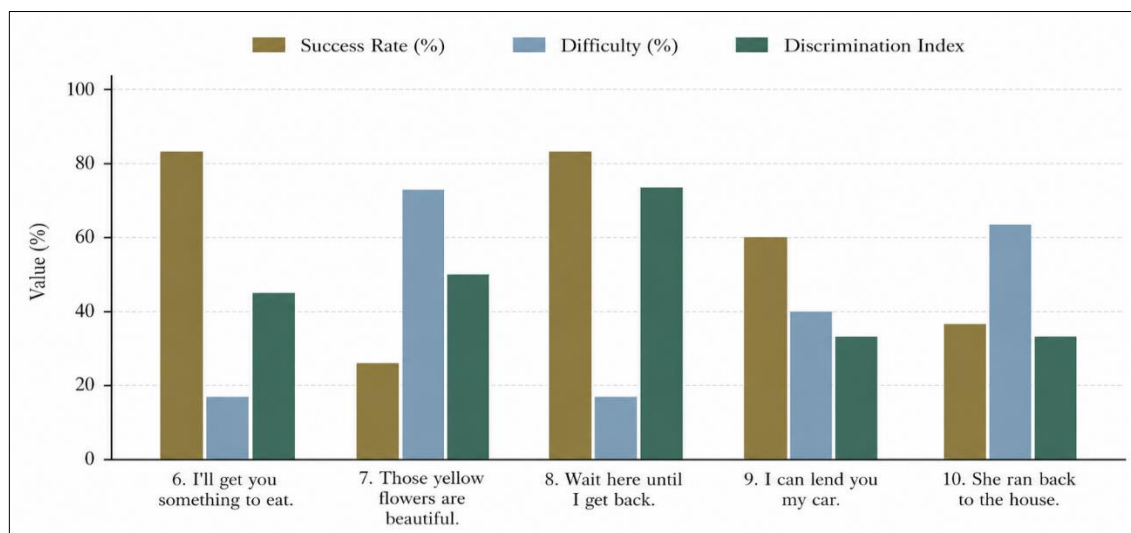


Figure 3. Comparison of key metrics across all sentences.

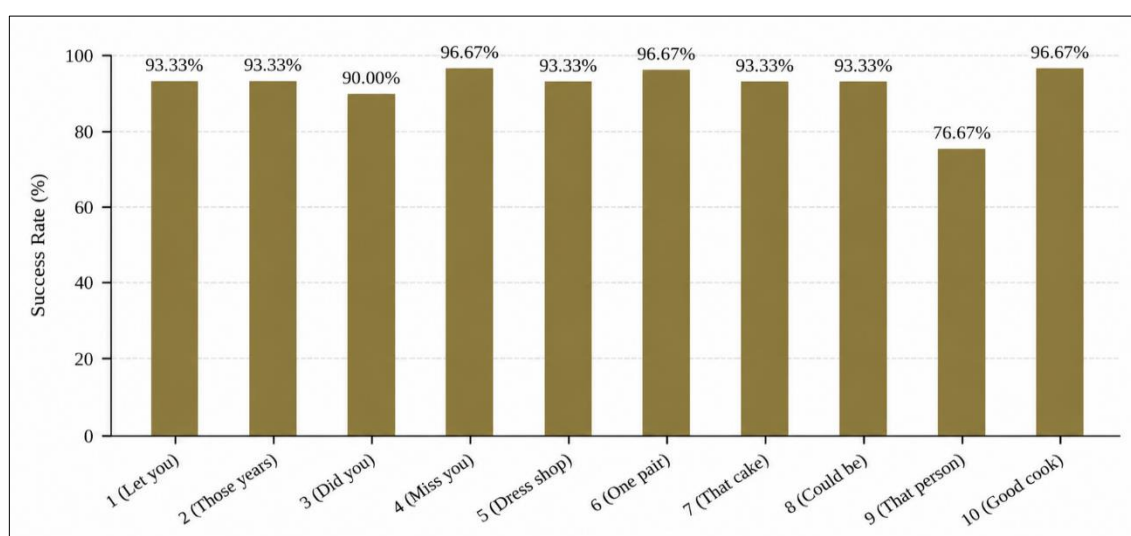


Figure 4. ABX assimilation test: Success rate per item.

4.4 Perception of Elision

Table 4 summarises performance on the elision items in the dictation test. Accuracy scores ranged from 63.33% to 96.67% across the five items. The highest accuracy was recorded for 'Most people exercise to stay healthy' and 'The old man walked slowly' (both 96.67%), and these items were classified as extremely easy based on their difficulty indices. 'How do you find learning Spanish?' also showed high accuracy (76.67%), placing it in the fairly easy category. In contrast, 'Who has the best job?' (83.33%) Moreover, 'Can you ask her to come early?' (63.33%) demonstrated greater variation in discrimination; the former showed very weak discrimination (19.90), while the latter displayed very good discrimination (60.30). The overall mean accuracy for elision items on the dictation test was 83.33%, with a corresponding difficulty index of 17%, indicating that these items were easy for the participants. The overall discrimination index was 35.48, classified as adequate. These findings indicate that most elision items were accessible to participants, although individual items differed in their ability to distinguish between learners with varying levels of performance. The variation in discrimination values suggests that item difficulty alone did not determine how effectively each sentence measured participants' abilities.

Table 4. Descriptive statistics, difficulty indices, and discrimination indices for elision items using the dictation test.

Sentence	Correct answers		Mean	Std. Dev.	Difficulty	Difficulty level	Discrimination	Discrimination level
	Freq.	%						
11- Who has the best job?	25	83.33%	0.833	0.379	16.67%	Easy	19.90	Very weak discrimination
12- How do you find learning Spanish?	23	76.67%	0.767	0.430	23.00%	Fairly easy	41.90	Very good discrimination
13- Most people exercise to stay healthy.	29	96.67%	0.967	0.183	3.00%	Extremely easy	34.10	Adequate discrimination
14- The old man walked slowly.	29	96.67%	0.967	0.183	3.00%	Extremely easy	21.20	Weak discrimination
15- Can you ask her to come early?	19	63.33%	0.633	0.490	37.00%	Average difficulty	60.30	Very good discrimination
Overall Average	25	83.33%	0.833	0.333	17.00%	Easy	35.48	Adequate discrimination

Figure 5 presents dictation item performance, showing that higher accuracy generally indicated lower difficulty. Variations in discrimination reflected differences in item sensitivity, with ‘Can you ask her to come early?’ showing stronger discrimination, while some high-accuracy items had weaker discriminatory power.

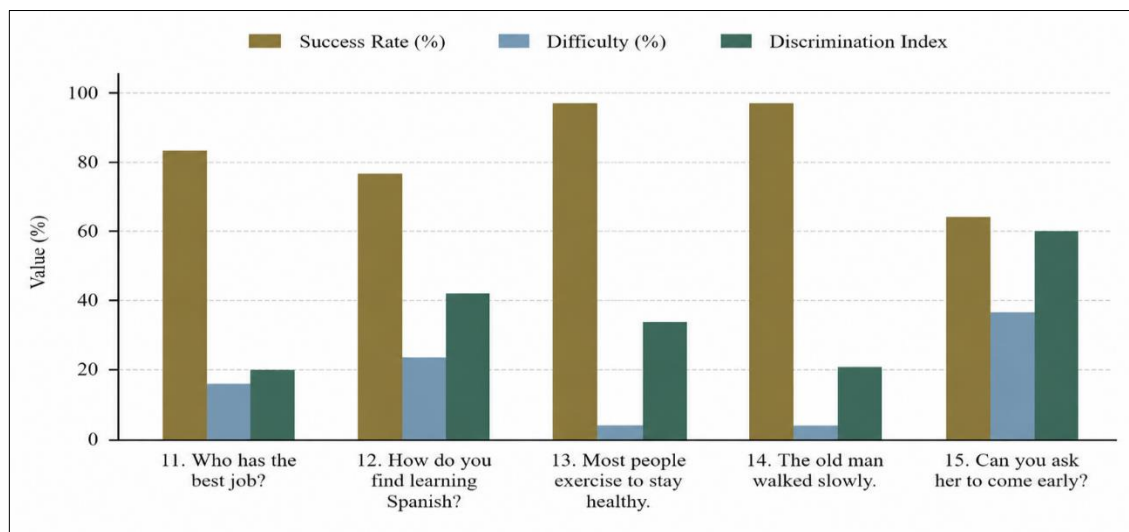
**Figure 5.** Comparison of key metrics across all sentences.

Figure 6 presents the ABX discrimination test results for elision. Accuracy scores ranged from 76.67% to 93.33%, with a mean accuracy of 89.33%, indicating that learners generally found the items easy to discriminate. However, discrimination values varied, as some high-accuracy items showed limited ability to distinguish between higher- and lower-performing learners. The results suggest that while participants demonstrated strong overall recognition of elision patterns, individual items differed in their effectiveness as measures of learner performance. Items with higher discrimination indices provided greater insight into differences among participants, whereas items with lower indices contributed less variation to the assessment.

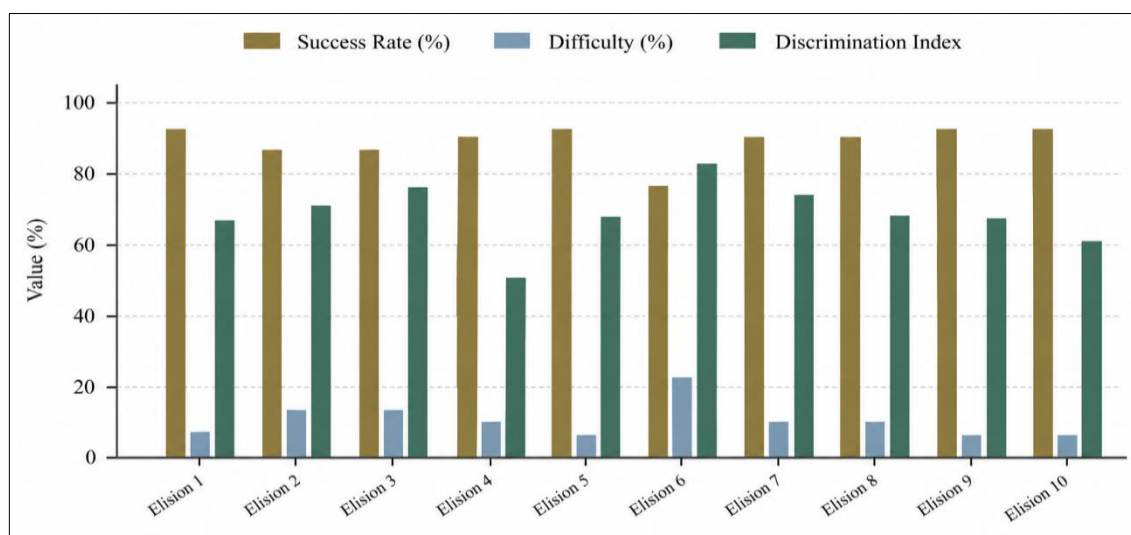


Figure 6. ABX elision test: Item comparison.

4.5 Cross-feature Comparison

A comparison of learner performance across the three connected speech features shows consistent differences in accuracy, difficulty, and discrimination values. On the dictation test, elision items produced the highest overall accuracy (83.33%), followed by assimilation (74.66%), while linking items recorded the lowest accuracy (63.33%). Difficulty indices reflected a similar pattern: elision items were classified as easy, assimilation items fell within the average difficulty range, and linking items were the most difficult for learners. Discrimination indices also varied across features, with assimilation showing the highest overall discrimination value (47.00), followed by linking (38.80) and elision (35.48), indicating differences in the extent to which each feature set differentiated learners' performance.

Across the ABX discrimination test, performance was consistently high for all three features. Assimilation items showed an overall mean accuracy of 92.33%, elision items achieved 89.33%, and linking items displayed accuracy values near ceiling level. Difficulty indices were low across all features due to the high number of correct responses. Although discrimination values varied due to ceiling effects, item-level comparisons showed limited spread in accuracy across all features, with minimal variation among learners in this controlled perceptual environment.

5. DISCUSSION

This study demonstrates a consistent hierarchy of difficulty: elision was perceived with the greatest accuracy, assimilation showed moderate success, and linking proved most challenging. Although accuracy was higher in the ABX task, the relative ranking of the features remained stable. This stability indicates that learners' challenges are not merely task-dependent but reflect deeper phonological, cognitive, and experiential constraints.

The strong performance on elision suggests that deletions provide salient acoustic cues that learners can detect even under real-time processing demands. This aligns with [Felker et al. \(2019\)](#), who argued that temporal gaps enhance perceptual prominence. At the same time, the current study shows that lexical familiarity also contributed to success, as learners were more accurate when elision occurred in predictable, high-frequency collocations. By contrast, assimilation showed uneven perceptibility. Students performed better with stop-to-affricate and nasal assimilation, but their performance with fricative-based processes remained lower, consistent with [Fitriani \(2024\)](#). The difficulty with assimilations producing unfamiliar segments such as /ʒ/ suggests that salience interacts with phonemic familiarity: even when acoustic cues are present,

learners struggle to interpret segments that do not exist in their L1 phonemic inventory. Linking remained the least accurately perceived feature, particularly in the dictation task. Linking requires learners to detect subtle coarticulatory cues, which differ from the distinct segmental sounds they normally focus on. This difficulty corroborates the findings by [AlQbailat et al. \(2024\)](#), who noted that Arabic syllable structure does not naturally support resyllabification across word boundaries.

Cross-linguistic influence further shaped perceptual outcomes. The tendency of Arabic speakers to expect clear word boundaries makes English C–V linking counterintuitive, and the reliance on L1 segmentation patterns remained evident even in the simplified ABX task. Assimilation difficulties also reflect L1 constraints, particularly when the resulting consonant does not exist in Arabic. These findings challenge the assumption, suggested by [Zhu and Hu \(2024\)](#), that reducing task complexity weakens L1 transfer. Instead, they indicate that L1-based listening routines operate at a deep perceptual level and are not easily overridden by changes in task format. Limited exposure to naturalistic spoken English, common among Saudi male learners, likely reinforces these habits, as their listening experience is dominated by clearly articulated teacher speech rather than reduced forms.

Beyond phonology and L1 influence, cognitive load helps explain the gap between dictation and ABX scores. The ABX format requires only a binary auditory judgment, allowing learners to focus on acoustic differences, whereas dictation demands simultaneous decoding, segmentation, meaning construction, and orthographic retrieval. Consistent with [Mora and Darcy \(2023\)](#), the increased processing load in dictation appears to have obscured subtle cues, especially for linking. Lexical familiarity further interacted with these effects: predictable expressions such as ‘sold out’ were perceived more accurately, whereas less familiar combinations such as ‘olive oil’ were often misinterpreted. This supports [McGuire and Larson-Hall’s \(2021\)](#) argument that L2 listeners rely on stored lexical templates when processing ambiguous or reduced input. However, the present results show that such reliance can both facilitate and hinder perception, depending on context.

Synthesising these findings reveals that the observed perceptual hierarchy reflects interactions among phonological salience, L1 phonological structure, cognitive load, and exposure to reduced speech. Elision was accurately perceived because it provides strong acoustic cues and often appears in familiar lexical patterns. Assimilation showed moderate perceptual accuracy, but learners struggled when the resulting segment was unfamiliar. Linking was consistently the most problematic feature, as it depends on prosodic cues to which learners are not accustomed and which are rarely encountered in the classroom input they typically receive.

These insights carry clear pedagogical implications. Given that linking emerged as perceptually more challenging than assimilation and elision, instructional interventions should prioritise raising learners’ awareness of resyllabification and word-boundary cues before addressing segment deletion and assimilatory processes. Since learners may not develop sufficient sensitivity to reduced forms through exposure to classroom speech alone, explicit instruction in connected-speech processes is essential. Such instruction should incorporate contrastive analysis of English and Arabic phonological patterns to mitigate negative transfer and expand learners’ repertoire of high-frequency collocations, supporting top-down processing during listening. In addition, pedagogical activities such as shadowing, guided transcription, and controlled exposure to authentic spoken media can facilitate the development of real-time processing skills, particularly under conditions of increased cognitive load. Finally, combining ABX-type discrimination tasks with dictation in classroom assessment can help teachers identify feature-specific perceptual difficulties and monitor learners’ progress across varying processing demands.

The findings reveal that Saudi students face multiple challenges that intersect with their language skills, thinking abilities, and life experiences. Addressing these constraints requires targeted pedagogical interventions that enhance learners’ phonological awareness while gradually increasing their exposure to naturalistic reduced forms. Through this integrated approach, the study contributes to a clearer understanding of L2 connected-speech perception and offers practical recommendations for improving listening instruction in Saudi EFL contexts.

6. CONCLUSION

This study investigated Saudi EFL learners' perception of three connected speech features: linking, assimilation, and elision using dictation and ABX discrimination tasks. The ABX task demonstrated that learners could reliably discriminate phonological contrasts under lower cognitive load. In contrast, the dictation test revealed greater difficulties with real-time processing when reductions were subtle, masked by prosody, or inconsistent with learners' segmentation strategies. The findings highlight four factors shaping Saudi learners' perception of L2 sounds: phonological salience, L1 transfer, lexical familiarity, and limited exposure to English speech. The study shows that students will not develop their ability to understand connected speech through regular listening practice, as they need targeted instruction in reduced forms, prosodic features, and language variations between their native tongue and English.

Despite the valuable insights provided by this study, several limitations should be acknowledged. The study was restricted to a relatively small group of male pre-intermediate Saudi learners, which limits the extent to which the results can be generalised to female learners, learners at more advanced proficiency levels, or individuals from different sociolinguistic backgrounds. Moreover, the perceptual tasks employed, the dictation and ABX discrimination, capture specific components of listening but cannot completely represent performance in real communication situations, which require extra mental work and environmental factors.

These limitations suggest several promising directions for future research. Broader sampling across proficiency levels, genders, and Arabic dialects would enhance the generalizability of findings on connected speech perception among Saudi and other Arab EFL learners. Longitudinal designs would allow researchers to monitor developmental changes over time, while integrating production measures could help researchers understand how perception relates to production. Importantly, classroom-based intervention studies are needed to evaluate the pedagogical effectiveness of techniques such as ABX training, shadowing, and explicit instruction in reduced forms and prosody. Such research would deepen our understanding of how targeted instructional approaches can strengthen learners' perceptual skills and ultimately support more effective listening comprehension in authentic English communication.

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CRedit authorship contribution statement

G.R.K.M. – Conceptualisation, Methodology, Investigation, Formal Analysis, Data Curation, Visualisation, Writing – Original Draft

R.H. – Conceptualisation, Methodology, Supervision, Writing – Review & Editing

W.A.W.A. – Validation, Supervision, Writing – Review & Editing

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used Claude (Anthropic) to improve language clarity and readability and to check reference formatting, and ChatGPT (OpenAI) to reduce repetition and to assist with the graphical presentation of numerical data. After using these tools, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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