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Metalinguistic Awareness and L2 English Reading Comprehension among Pakistani Undergraduates: The Predictive Roles of Morphological and Syntactic Awareness

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Abstract

This study examined the extent to which morphological awareness (MA) and syntactic awareness (SA) predict English reading comprehension among Pakistani Urdu-speaking undergraduates, after controlling for receptive vocabulary. A quantitative, cross-sectional, correlational design was employed. Data were collected from 112 participants through an online test battery delivered via Google Form, consisting of four instruments: a background questionnaire, a 25-item receptive vocabulary test (Vocabulary Levels Test), a 20-item derivational MA task, a 20-item grammaticality judgement task for SA, and a 10-item reading comprehension test. Data analysis involved descriptive statistics, Pearson correlation to examine bivariate relationships, and a two-step hierarchical multiple regression to determine the unique and joint predictive contributions of MA and SA. Results showed that both MA and SA correlated positively with reading comprehension. However, after controlling for vocabulary, SA emerged as the stronger unique predictor ($sr^2 = .065$, $p = .001$), while MA did not reach statistical significance ($p = .056$) in the full model. The findings suggest that for Urdu-L1 learners, syntactic awareness plays an especially important role in academic reading, possibly due to typological differences between Urdu (SOV) and English (SVO). The study recommends explicit syntax instruction in Pakistani university English programs.

Keywords: Metalinguistic Awareness, Syntactic Awareness, Morphological Awareness, Reading Comprehension, Urdu-Speaking Learners, Quantitative Design, Grammaticality Judgement Task

1. INTRODUCTION

1.1 The Problem of L2 Academic Reading

The millions of students studying English-medium degrees in universities throughout South Asia are no longer required simply to be able to read academic literature written in English as an auxiliary activity. This ability to read academic texts in English is now essential in accessing, analyzing, and reproducing knowledge within the relevant discipline. In particular, higher education policy in Pakistan has ensured a rapid movement towards the use of English for instruction in universities, meaning that students who have spent the majority of their school years being taught in Urdu or another regional language are immediately asked to read and analyze English texts. (Halo et al., 2024; Ramzan & Alahmadi, 2024). The cognitive and linguistic demands that this transition places on learners are considerable and evidence at hand indicate that many Pakistani undergraduates enroll in a university without the language-related sub-skills to meet those demands effectively (Halo et al., 2024). Nevertheless, the study of reading comprehension in English in the context of higher education in Pakistan is very limited. The majority of L2 reading research with non-native English-speaking learners has been conducted in East Asian populations, such as Chinese, Korean, Japanese and, to a lesser degree, Hispanic and Arabic-speaking learners (Alshehri & Zhang, 2022; Liu et al., 2024; Zhang & Lin, 2021). Students of Pakistani learners, who use a Perso-Arabic script, a rich derivational morphology and a subject-object-verb (SOV) word order in their first language (Urdu), are structurally far removed from all three of these populations yet they make very little appearance in the Scopus-indexed literature on L2 reading cognition. The present study is aimed at directly solving this gap.

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1.2 Metalinguistic Awareness as an Explanatory Construct

One of the most theoretically appealing and empirically supported theories of L2 reading comprehension variability is metalinguistic awareness (MLA), which refers to the learner's ability to actively focus on, reflect on, and manipulate the formal aspects of language without reference to meaning. Capacity differs from implicit linguistic knowledge by its volitional, controllable, and introspective properties, which are essential in the academic reading context, where readers often encounter unfamiliar words, complex syntactic structures, and dense propositional words that cannot be processed via automatic recognition (Grabe & Stoller, 2020). MLA is not a unitary construct. Research consistently distinguishes among phonological, morphological, and syntactic sub-components, and while all three have been associated with reading outcomes, morphological awareness (MA) and syntactic awareness (SA) have emerged as the most reliable predictors of reading comprehension beyond the early decoding stage, when phonological awareness has already fulfilled its primary developmental function (Liu et al., 2024; Zhang & Lin, 2021). MA refers to sensitivity to the internal morphemic structure of words — the ability to decompose complex forms into roots, prefixes, and suffixes and to draw on that decomposition in meaning construction. SA refers to sensitivity to the grammatical organisation of sentences, the ability to detect and repair structural violations and to use syntactic cues in parsing clause-level meaning during reading. The present study focuses on these two components.

1.3 What We Know and Where the Evidence Falls Short

The empirical case for MA as a predictor of L2 reading comprehension is now well-established. A 2024 meta-analysis by Liu et al., drawing on 63 independent samples, reported a significant overall association between MA and reading comprehension ($r = .565$), confirming the robustness of this relationship across age groups and orthographic systems (Liu et al., 2024). More recent work with adult L2 learners, including studies of Arabic-speaking EFL learners (Alshehri & Zhang, 2022), Japanese EFL learners (Yamashita & Kusanagi, 2024, as cited in Satori, 2025), and Chinese EFL students (Zhang, 2021), has refined understanding of the pathways involved. Specifically, Alshehri and Zhang (2022) and Zhang (2021) demonstrated that it is the knowledge-based components of morphological processing, sensitivity to morpheme meaning and morpheme use, that drive the relationship with reading, rather than rapid sub-lexical segmentation per se. The picture for SA is somewhat less developed but convergent. Zhou (2022) demonstrated, among 209 adult learners of L2 Chinese, that syntactic awareness made a unique and statistically significant contribution to passage-level reading comprehension even after age, vocabulary knowledge, and morphological awareness were controlled for in a multiple regression model. The processing account on which this finding rests is well established: complex sentence structures can be processed in SA, and clause-level meaning can be integrated without prohibitive reliance on functional memory (Grabe & Stoller, 2020). However, two major research gaps still exist within the reviewed body of work. First, the relative predictive impact of MA over SA is unknown. There is only a handful of papers where both factors have been used in the same regression analysis aimed at predicting L2 reading comprehension, and the results are conflicting. Thus, Zhang and Lin (2021) discovered that morphosyntactic awareness had a stronger direct relationship with L2 reading comprehension scores compared to morphosemantic awareness, which mostly contributed indirectly through vocabulary. On the contrary, Alshehri and Zhang (2022) observed the inverse order of factors under specific measurement conditions. Liu et al. (2024) pinpointed the lack of research comparing both factors simultaneously as one of the major methodological gaps in the field. The second gap is related to population representativeness. As mentioned, the research corpus for MLA is overwhelmingly made-up of East Asian and Hispanic L2 populations. The impact of this are far beyond demograpic. The hypothesis of modulating transfer of metalinguistic skills across languages by L1 typological distance (LTD) has been investigated with learners whose L1 orthography, morphology, and syntactic structure are all relatively distant from English, but this hypothesis has been scarcely tested with learners whose LTD in all three areas is high (Liu et al., 2024; Grabe & Stoller, 2020). This is exactly

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what Urdu with its Nastaliq script, its root-pattern derivational morphology and its SOV syntax provide: Pakistani L2 learners are an important yet empirically neglected population from a theoretical point of view.

1.4 The Pakistani Context

The socio linguistic settings in Pakistan pose a complex set of reading related problems, which are in several ways unique. English is the official language of Pakistan, and the language of higher education, the law, and formal government, but for the majority of Pakistanis it is neither a first nor a home language. Most undergraduates come to university with a background of education in Urdu or one of the regional languages (Punjabi, Sindhi) or a mixture of both where English language is taught as a subject and not as the medium of instruction (Halo et al., 2024; Ramzan & Alahmadi, 2024). Thus, the transition from native language to English is sudden when teachers begin teaching in English at the university level, which puts special strain on students' L2 resources. Most importantly, Urda's morphology is distinct from English in some respects which can impact the processing of English academic vocabulary by Urda-L1 learners. English uses many Latin and Greek affixes applied to the left of the root, in a concatenative left to right structure, in the derivational morphology. Urdu uses a non-concatenative root-and-pattern structure, using the consonantal base for semantic content and the vowel patterns for grammatical categories, in addition to concatenative affixation, in contrast to the latter (Schmidt, 1999). The role that these structural differences play in the facilitation and/or constraint of the development of MA for the L2, namely English, by Urdu-L1 learners is an open empirical question that has not yet been examined by the existing literature. From a syntactic viewpoint, the SOV order of Urdu differs from the SVO order of English, suggesting that Pakistani learners may encounter specific parsing difficulties while processing English relative clauses, passives and wh-constructions, which are the structures addressed by the batteries of syntactic awareness in the L2 reading literature (Zhou, 2022). The typological factors highlighted here further justify the study of the population with MA and SA, and not the inferences made from the results of structurally different L1 groups.

1.5 The Present Study

The present research attempts to investigate the degree of correlation and prediction between the two aspects of morphological awareness and syntactic awareness for reading comprehension in English, while controlling for the major confounding and mediating factor of vocabulary knowledge between the two types of awareness, MLA and reading comprehension ability, as found by Alshehri & Zhang (2022); Liu et al. (2024); Zhang & Lin (2021). The research design of this research is quantitative, correlational, and predictive where data will be collected through an online test battery made up of the vocabulary test, morphological awareness test, grammatical judgment test, and a reading comprehension test. The study responds to three converging calls in the recent literature: the call for comparative MA–SA predictor models within a single sample (Liu et al., 2024), the call for MLA research with typologically under-represented L1 populations (Liu et al., 2024), and the call for empirical evidence on the English literacy skills of Pakistani ESL learners at university level (Halo et al., 2024). In doing so, it aims to extend the theoretical scope of the MLA–reading relationship and to generate evidence with direct implications for English curriculum design in Pakistani higher education.

1.6 Research Questions

The study is guided by the following research questions:

RQ1. To what extent do morphological awareness and syntactic awareness jointly predict English reading comprehension in Pakistani L2 undergraduates, after controlling for receptive vocabulary?

RQ2. What is the bivariate relationship between morphological awareness and English reading comprehension in this sample?

RQ3. What is the bivariate relationship between syntactic awareness and English reading comprehension in this sample?

RQ4. Which predictor — morphological awareness or syntactic awareness — accounts for greater

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unique variance in reading comprehension after vocabulary is controlled?

These questions are addressed within a hierarchical multiple regression framework, with vocabulary knowledge entered as a first-step control variable and both metalinguistic predictors entered simultaneously at the second step, permitting examination of both joint and relative (semi-partial) contributions.

1.7 Significance of the Study

This study makes contributions at three levels. Empirically, it delivers what is, to the researcher's knowledge, the first quantitative investigation of the MA–SA–reading relationship in Pakistani L2 undergraduates, extending the geography of MLA research to a population whose L1 is typologically distant from English in orthography, morphology, and syntax simultaneously. Theoretically, by including both MA and SA in a single hierarchical regression model with vocabulary controlled, it addresses a specific methodological gap identified by Liu et al. (2024) and provides comparative predictor evidence that will help adjudicate between competing accounts of the MLA–reading interface. From a pedagogical perspective, the findings indicates whether there is a stronger case for English programmes in Pakistani universities to invest in explicit morphology instruction, explicit syntax instruction, or both – a question that has direct implications for curriculum design and classroom practice.

2. Literature Review: Metalinguistic Awareness and Reading Comprehension

Over the past few years, there has been growing interest in the link between metalinguistic awareness and reading comprehension, and researchers have realized that metalinguistic knowledge is an important component in successful reading outcomes. S. Ke et al. (2023) identified that there are multiple components of metalinguistic awareness and they each make unique contributions to reading development in various populations and settings.

2.1 Morphological Awareness and Reading Comprehension

Morphological awareness has consistently been shown to be a strong predictor of reading comprehension in children of differing ages. For university students, morphological awareness is a strong predictor of their reading speed and comprehension, again even with the other predictors known to predict reading speed and comprehension, namely phonological decoding, orthographic processing, vocabulary and working memory (WM) skills Maddie Kotzer et al, 2021. This result contradicts previous research which had suggested that morphological skills were not needed once the reader is fluent. The predictive role of morphological awareness seems to be stronger in the adolescent population. In grades 5-8, the researchers found that morphological awareness accounted for significant variance (13-17%) in reading comprehension, and four of these distinct skills together accounted for 50% of the variance in standardized reading comprehension measures Amanda P. Goodwin et al., 2021. The evidence from the meta-analysis also aligns with these results, showing a moderate correlation (r = .54) between morphological awareness and reading comprehension from studies with various populations J. Lee et al., (2022). Morales is relevant, as morphological awareness shows, from the early stages of reading development. When controlling for decoding and vocabulary, morphological awareness accounted for unique variance in reading comprehension in concurrent and subsequent reading by grade one students (4% and 5%, respectively) (Erin Sparks & J. Metsala, 2023). The effect was heightened in second grade when morphological awareness accounted for 5% of unique variance when decoding, vocabulary, and syntactic awareness were accounted for as covariables.

2.2 Syntactic Awareness and Reading Comprehension

Another important aspect of metalinguistic awareness that plays a key role in determining reading comprehension is syntactic awareness which is characterized by reflecting on and manipulating the structure of sentences. A study on monolingual Chinese speakers, which controlled for age, nonverbal intelligence, and oral vocabulary, found syntactic awareness to explain 7-13% of the variance in measures of reading comprehension (Sun Baoqi et al., 2020). S syntactic awareness is also relevant in second language context. The syntactic awareness also contributed to passage-level reading

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comprehension uniquely in the L2 Chinese learning context, despite controlling for character knowledge, vocabulary knowledge, and morphological awareness (Jing Zhou, 2022). Intriguingly, although grammatical judgement and correction abilities and word order knowledge showed good predictive power for L2 Chinese reading comprehension, word order knowledge seemed to perform best.

2.3 Second Language and EFL Contexts

Metalinguistic awareness is very complex in L2 learning contexts. The results of 4 English learners at varying proficiency levels indicate that in multiple ways of mediation, morphological awareness helps in comprehension of English reading, in varying degrees (Jie Zhang et al., 2020). Morphological awareness mediated the cross-level interaction between native English speakers and fluent English learners reading vocabulary and morphology for both groups of students; in addition word reading fluency mediated the interaction between native English speakers and limited English fluency learners. In Iranian EFL contexts, there have been comprehensive studies that have focused on the combined predictive value of vocabulary, syntax and metacognitive strategies. Results showed that these three factors collectively explained 88% of the variance in changes in reading comprehension, with vocabulary explaining 54%, syntax 33%, and metacognitive strategies explaining 15% (M. Sarbazi et al., 2021). The results reported here indicate that syntactic knowledge is an important aspect of L2 reading comprehension.

2.4 The Pakistani Context

Research specifically investigating EFL learners in Pakistan provides valuable insights into syntactic awareness in this specific linguistic context. In a study of 100 students, Muqaddar Zaka et al. (2026) recently found that EFL learners in Pakistani universities showed moderate to good levels of syntax awareness, which positively affected their reading comprehension. The study found that long sentences with many clauses, passive sentences and complex connectors were particularly difficult. It observed that learners use strategic approaches to comprehending long sentences, such as finding the subject and verbs first and breaking the sentence down into manageable parts.

2.5 Implications and Future Directions

The overall evidence clearly favors the continuing importance of metalinguistic awareness throughout reading development from early elementary school years through university level. Results indicate that morphological awareness and syntactic awareness contribute to reading comprehension in unique and meaningful ways over and above other well-established predictors such as vocabulary and decoding skills. But there are still a lot of unanswered questions, especially when it comes to the precise processes by which metalinguistic awareness functions in various L2 contexts and how linguistic and cultural backgrounds may influence these connections. Despite Pakistan's sizable English-learning population, there is a dearth of research in Pakistani contexts, which makes it a crucial subject for further study. These results have significant ramifications for educational practice, indicating that reading curricula at all educational levels should incorporate explicit instruction in morphological and syntactic awareness, paying special attention to the particular difficulties faced by EFL students in various linguistic and cultural contexts.

3. Methodology

3.1 Research Design

In this study, quantitative cross sectional correlational design was employed to examine the relationship between morphological awareness, syntactic awareness, receptive vocabulary, and English reading comprehension among Pakistani ESL undergraduates. Also, in this study to what extent morphological awareness and syntactic awareness predicted RC (reading comprehension after receptive lexical resource control.

3.2 Participants

There were 120 undergraduate students enrolled in Pakistani universities as participants. The sample size was determined using G*Power 3.1. With three predictors, a medium effect size ($f^2 = .15$), an alpha level of .05, and statistical power of .80, the minimum required sample was 77 participants. A

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larger sample was recruited to improve the reliability of the findings. Participants were between 18 and 25 years of age and had completed their schooling in Pakistan. Students who identified themselves as native or near native speakers of English were excluded from the study. Participants were recruited through convenience and snowball sampling using university networks and student WhatsApp groups.

3.3 Instruments

Data were collected through a Google Form consisting of four sections.

Background Questionnaire

The first section collected demographic and linguistic information. Participants reported their age, gender, academic discipline, year of study, first language, years of English instruction, and self assessed English proficiency based on CEFR descriptors.

Receptive Vocabulary Test

Receptive vocabulary knowledge was measured using a 25 item adaptation of the Vocabulary Levels Test (Webb et al., 2017). The test sampled vocabulary from the 2000, 3000, and 5000 word levels. Scores ranged from 0 to 25.

Morphological Awareness Task

A 20-item derivational word creation test modified from Zhang and Koda (2012) was used to gauge morphological awareness. To finish a sentence, participants choose the most suitable derived form of a base word. The maximum score was 20, with one point awarded for each right response.

Syntactic Awareness Task

A 20-item Grammaticality Judgement Task that was modified from earlier research was used to gauge syntactic awareness. Participants evaluated the grammatical correctness of sentences. Items on subject-verb agreement, relative sentences, passive constructions, and wh movement were included in the task. The range of scores was 0 to 20.

Reading Comprehension Test

Ten multiple-choice questions were used after two brief explanatory pieces to gauge reading comprehension. Literal, inferential, and main concept understanding were all assessed by the questions. Ten was the highest possible score.

3.4 Data Collection Procedure

Google Forms was used to gather data online. Before filling out the questionnaire, participants read an information leaflet and gave their informed consent. The URL to the poll was shared via student organizations and university contacts, and it was available for three weeks.

Responses were examined for eligibility and completeness following data collection. Prior to analysis, cases with unrealistic completion times, incomplete responses, or unsuccessful attention checks were eliminated.

3.5 Ethical Considerations

Prior to data collection, ethical approval was acquired from the appropriate institutional authority. Every subject gave their informed consent, and participation was entirely voluntary. No personally identifying data was gathered. All information was safely kept and utilized exclusively for study.

3.6 Data Analysis

IBM SPSS Statistics 27 was used to analyze the data. Prior to doing inferential analyses, the dataset was checked for missing values, outliers, normality, and multicollinearity.

For every variable, descriptive statistics were computed. Cronbach's alpha was used to evaluate reliability. The links between morphological awareness, syntactic awareness, receptive vocabulary, and reading comprehension were investigated using Pearson correlation analysis. A two step hierarchical multiple regression analysis was performed to determine the predictive contributions of morphological awareness and syntactic awareness. Receptive vocabulary was entered in the first step as a control variable. Morphological awareness and syntactic awareness were entered in the second step. Changes in explained variance, standardized beta coefficients, and semi partial correlations were examined to evaluate the contribution of each predictor.

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3.7 Validity and Reliability

The instruments were adapted from established measures that have been widely used in second language research. Reliability was assessed through Cronbach's alpha during both the pilot study and the main study. In addition, an attention check item and data screening procedures were used to improve data quality.

3.8 Limitations

Several limitations should be noted. Data were collected online and under unmonitored conditions. The use of convenience and snowball sampling limits the generalizability of the findings. English proficiency was measured through self reports rather than a standardized proficiency test. Finally, the cross sectional design does not allow causal conclusions to be drawn.

4.1 Preliminary Analyses

4.1.1 Sample. Out of a total of 131 questionnaires that were filled out, 19 were excluded from analysis because 8 did not answer the attention check item embedded in the test, 6 completed the test in less than 10 minutes, 3 took more than 60 minutes, and 2 claimed native-like English proficiency. The final sample size was thus 112 subjects (64 females, 46 males, 2 not specifying gender). The subjects were aged between 18 and 25 years, with an average age of 20.4 years (SD=1.7). Subjects' academic areas included English Language & Literature (34%), social sciences (28%), natural sciences (21%), and other disciplines (17%). They had studied English for 8 to 16 years, with an average period of 11.8 years (SD=2.1). Of the subjects, 78% attended Urdu-medium schools, while the rest attended Urdu-English medium schools. Self-rated CEFR proficiency was predominantly B1 (41%) and B2 (38%), with smaller proportions at A2 (12%) and C1 (9%).

4.1.2 Internal Consistency. The main-study data was used to calculate Cronbach's α for each instrument sub-scale. Values were: VLT $\alpha = .76$, MA task $\alpha = .81$, GJT (SA) $\alpha = .78$, reading comprehension measure $\alpha = .74$. Every value matched or surpassed the predetermined cutoff point of $\alpha \geq .70$ (Creswell & Creswell, 2023).

4.1.3 Normality and Outlier Screening. Results obtained from Shapiro-Wilk tests confirmed that there was no significant deviation from normal distribution among MA scores ($W = 0.979$, $p = .075$). The presence of mild, yet insignificant, negative skew was found in VLT scores (skewness = −0.38), SA scores (skewness = −0.45), and RC scores (skewness = −0.24); meanwhile, the kurtosis values were all within the allowable range of ±2.0. There were only three univariate outliers based on z-scores larger than ±3.29 on VLT; however, the responses given by such outliers appeared to be believable enough, thus keeping all data points intact. In relation to multivariate outliers, none were found according to the Mahalanobis distances since all obtained χ^2 values were lower than the cut-off value at $p = .001$ and $df = 4$. All obtained VIFs for the three independent variables were less than 5.0.

4.2 Descriptive Statistics

Statistics for all four variables and reliabilities of instruments are provided in Table 1 below. The average receptive vocabulary score for the sample was 14.01 (SD = 4.01) out of 25, indicating that participants had mostly reached the 2,000-3,000 word-frequency level of VLT, which was reasonable for Urdu-speaking university students coming from an Urdu-language educational background. The average MA score was 11.03 (SD = 3.49) out of 20, ranging from 0 to 19. The average SA score was 11.96 (SD = 3.24) out of 20. Mean reading comprehension score was 5.90 out of 10 (SD = 1.89).

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Table 1
Descriptive Statistics and Internal Consistency Estimates for All Study Variables

Variable	n	M	SD	Min	Max	Skewness	Cronbach's α
Receptive Vocabulary (VLT)	112	14.01	4.01	4	22	−0.38	.76
Morphological Awareness (MA)	112	11.03	3.49	0	19	−0.22	.81
Syntactic Awareness (SA)	112	11.96	3.24	2	18	−0.45	.78
Reading Comprehension (RC)	112	5.90	1.89	1	10	−0.24	.74

Note. VLT = Vocabulary Levels Test (scored 0–25); MA = Morphological Awareness task (scored 0–20); SA = Syntactic Awareness Grammaticality Judgement Task (scored 0–20); RC = Reading Comprehension measure (scored 0–10). α = Cronbach's alpha.

4.3 Bivariate Correlations (RQ2 and RQ3)

Pearson product-moment correlations among all four variables are presented in Table 2. All correlations were positive, statistically significant at $p < .001$, and in the moderate-to-large range by Cohen's (1988) conventions.

MA was positively correlated with reading comprehension, $r = .444$, $p < .001$. SA was also positively correlated with reading comprehension, $r = .491$, $p < .001$. Vocabulary showed the strongest correlation with reading comprehension, $r = .569$, $p < .001$. Correlations among the predictor variables were moderate, ranging from .374 to .451.

Table 2
Pearson Correlation Matrix for Receptive Vocabulary, Morphological Awareness, Syntactic Awareness, and Reading Comprehension (n = 112)

Variable	1. VLT	2. MA	3. SA	4. RC
1. Receptive Vocabulary (VLT)	—	.451**	.374**	.569**
2. Morphological Awareness (MA)	.451**	—	.374**	.444**
3. Syntactic Awareness (SA)	.374**	.374**	—	.491**
4. Reading Comprehension (RC)	.569**	.444**	.491**	—

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Note. VLT = Vocabulary Levels Test; MA = Morphological Awareness; SA = Syntactic Awareness; RC = Reading Comprehension. All correlations significant at $p < .001$. **$p < .001$.

4.4 Hierarchical Multiple Regression (RQ1 and RQ4)

A two-step hierarchical multiple regression was conducted with reading comprehension as the criterion variable. Prior to regression, all regression assumptions were confirmed. Inspection of residual scatterplots indicated linearity and homoscedasticity. The Durbin–Watson statistic was 2.125, within the acceptable range of 1.5–2.5, confirming independence of residuals. The Shapiro–Wilk test applied to standardised residuals yielded $W = 0.988$, $p = .395$, indicating no significant departure from normality of the error distribution. VIF values ranged from 1.24 to 1.34, confirming that multicollinearity did not threaten the stability of the regression coefficients. Results are reported in Table 3.

4.4.1 Step 1: Receptive Vocabulary as Control Predictor. Receptive vocabulary (VLT) was used as the only predictor in Step 1. The model was statistically significant, $F(1, 110) = 52.73$, $p < .001$, accounting for 32.4% of the variance in reading comprehension, $R^2 = .324$. This demonstrated that vocabulary breadth, operationalized at the 2,000–5,000 word-frequency level, was a significant predictor of L2 reading performance in this sample, in line with its well-established position as the most powerful linguistic predictor in L2 reading studies (Alshehri & Zhang, 2022; Liu et al., 2024).

4.4.2 Step 2: Adding Morphological and Syntactic Awareness (RQ1). In Step 2, MA and SA were entered simultaneously alongside vocabulary. The overall model remained significant, $F(3, 108) = 27.50$, $p < .001$, $R^2 = .433$, adjusted $R^2 = .418$, indicating that the three predictors together accounted for 43.3% of the variance in reading comprehension. Disapprovingly, the addition of MA and SA produced a statistically significant increment in explained variance, $\Delta R^2 = .109$, $F(2, 108) = 10.42$, $p < .001$. The responses RQ1 agreeably: morphological and syntactic awareness jointly predicted significant additional variance in reading comprehension above and beyond receptive vocabulary.

4.4.3 Relative Predictive Strength (RQ4). the standardised regression coefficients and squared semi-partial correlations reveal asymmetric contributions from the two metalinguistic predictors. Syntactic awareness was a statistically significant unique predictor ($\beta = .284$, $t(108) = 3.53$, $p = .001$), accounting for $sr^2 = .065$ of unique variance in reading comprehension — equivalent to 6.5% of RC variance uniquely attributable to SA after the contributions of vocabulary and MA were removed. Morphological awareness, by contrast, did not reach conventional statistical significance as a unique predictor ($\beta = .162$, $t(108) = 1.94$, $p = .056$), with $sr^2 = .020$, indicating that it accounted for only 2.0% of unique RC variance. Receptive vocabulary remained the strongest independent predictor in the full model ($\beta = .390$, $t(108) = 4.66$, $p < .001$).

Above results answer RQ4 plainly: syntactic awareness ($sr^2 = .065$) accounted for substantially greater unique variance in reading comprehension than morphological awareness ($sr^2 = .020$) after vocabulary was controlled. The marginal p-value for MA ($p = .056$) warrants interpretive caution — it does not warrant concluding that MA is unrelated to reading comprehension, given its substantial bivariate correlation ($r = .444$), but rather that its unique contribution becomes difficult to isolate once vocabulary and SA are in the model, which is precisely the mediation pattern documented by Alshehri and Zhang (2022) and Zhang (2021).

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Table 3
Summary of Hierarchical Multiple Regression Analysis Predicting Reading Comprehension from Receptive Vocabulary, Morphological Awareness, and Syntactic Awareness (n = 112)

Step	Predictor	B	SE B	β	t	p	sr^2
1	Receptive Vocabulary (VLT)	.569	.078	.390	4.66	< .001	—
	$R^2 = .324$						
	$F(1, 110) = 52.73$, $p < .001$						
2	Receptive Vocabulary (VLT)	.390	.084	.390	4.66	< .001	—
	Morphological Awareness (MA)	.162	.084	.162	1.94	.056	.020
	Syntactic Awareness (SA)	.284	.081	.284	3.53	.001	.065
	$R^2 = .433$, $\Delta R^2 = .109$						
	$F(2, 108) = 10.42$, $p < .001$						

Note. VLT = Vocabulary Levels Test; MA = Morphological Awareness; SA = Syntactic Awareness; RC = Reading Comprehension. Coefficients are standardised (β). sr^2 = squared semi-partial correlation representing unique variance in RC. ΔR^2 reflects the increment in R^2 for Step 2 over Step 1.

4.5 Summary of Findings

All together, the findings provide answers to all four research questions posed at the outset of this study. On one hand, in response to RQ2 and RQ3, both MA and SA proved positively associated with English reading comprehension among the undergraduate Pakistani participants. Moreover, the correlation for SA (.491) was slightly higher than that for MA (.444). In regard to RQ1, the combination of MA and SA as predictors resulted in a statistically significant and substantial increase in explained variance ($\Delta R^2 = .109$, $p < .001$) beyond receptive vocabulary, supporting the role of MA in English reading comprehension. Finally, on the issue of the relative strength of the two variables in predicting reading comprehension (RQ4), SA demonstrated superior predictive power ($sr^2 = .065$, $p = .001$) compared to MA ($sr^2 = .020$, $p = .056$) when receptive vocabulary was controlled.

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5: Discussion, Implications, Limitations, and Conclusion

5.1 The Overall Predictive Model: Metalinguistic Awareness Beyond Vocabulary

Another significant conclusion of the current research was that MA and SA explained additional variance even when receptive vocabulary size was accounted for. Although the effect is small by established criteria (ΔR^2=.109), it still is practically meaningful. This result implies that knowing the number of words recognised by a learner – which variable, as we have seen, explains most variance and accounts for 32.4% on its own – is insufficient to fully account for differences in reading comprehension skills.the In broad terms, such findings are quite in line with the metalinguistic awareness literature that has been suggesting that reading comprehension goes beyond vocabulary knowledge for quite a while. According to Grabe & Stoller (2020), fluent reading of L2 texts involves using more than lexical resources. In order to understand the meaning, a reader must be sensitive to various aspects of grammar, including suffixed and prefixed forms (which denote different grammatical categories), relationships between different parts of a complex sentence structure, and many other linguistic features. Vocabulary size is simply not sufficient to handle all those tasks. It is also useful to clarify at least briefly what the model did not show. R^2=.433 indicates that almost half of variance still needs explaining. Reading comprehension is a complex trait that has various predictors. Even those not included in our analysis, such as working memory capacity, inferencing skills, readers' background knowledge, use of appropriate strategies, and second language spoken proficiency – among many other possible factors – should not be considered irrelevant. We need to bear in mind that the current study was meant to investigate metalinguistic skills specifically.

5.2 Syntactic Awareness as the Dominant Metalinguistic Predictor

The other result worth considering is the relative importance of SA and MA. In this respect, SA was found to be an independent predictor of reading comprehension performance (sr^2 = .065), while the independent predictive value of MA was marginally insignificant when controlling vocabulary and SA variables (sr^2 = .020, p = .056). In short, SA contributed significantly more independent variance than MA. The effect of MA on reading comprehension is documented in the meta-analytic literature (see Liu et al., 2024); by contrast, the issue of comparative effects of SA and MA remains empirically underexplored. One of the possible ways to understand the SA finding is to consider the processing demands of the test used to assess reading comprehension. First of all, the task entailed working with academic passages that contained nominal density, embedded clauses, and the use of passive voice. For readers who do not natively speak English, such linguistic features create substantial syntactic disambiguation demands that cannot be resolved simply on the basis of vocabulary knowledge alone. For Urdu-L1 learners who are used to an SOV word order, processing English SVO sentences containing centre-embedded relative clauses would require active syntactic parsing skills that allow to identify the grammatical role of each element in the sentence. Learners who perform well on the grammaticality judgement task, and therefore possess conscious syntactic knowledge, can rely less heavily on working memory in carrying out those operations (Grabe & Stoller, 2020). This point is confirmed by similar results reported by Zhou (2022) for L2 Chinese readers; in her study, syntax made a unique contribution to reading comprehension scores after vocabulary and morphology had been controlled for, with the grammaticality judgement measure being particularly effective. Finally, the findings could be interpreted in relation to typological differences between Urdu and English. Because Urdu is a language with SOV word order, readers of English L2 would be required to mentally remap the roles of grammatical elements (subject, verb, and object) which appear in different positions than expected based on prior learning experiences. Syntactic awareness operationalised as consciousness of English grammar helps to solve this problem. It is possible that the relationship between SA and reading comprehension is stronger among learners who speak languages typologically distant from English in terms of syntactic structure.

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5.3 Morphological Awareness: The Mediation Interpretation

It would be wrong to conclude that MA's non-significance in predicting the criterion in this study implies that morphological awareness is not important in reading comprehension among such readers. In fact, the relationship between MA and reading comprehension had a moderate-large effect size of r = .444, an effect size value well within the range observed by Liu et al. (2024) across 63 separate studies, as well as very close to the .41-.47 effect sizes observed by Alshehri and Zhang (2022) among Arabic-speaking EFL learners. The key question is how this relationship changes when vocabulary is controlled. The answer, in this dataset as in several others, is that MA's association with reading comprehension is substantially carried by its covariance with vocabulary knowledge. This pattern is consistent with the morphological pathway framework. Morphological sensitivity supports reading comprehension partly through direct routes (structural parsing, morpheme-meaning mapping during word recognition) and partly through an indirect route in which morphological knowledge facilitates vocabulary acquisition over time, and it is accumulated vocabulary that then drives comprehension (Satori, 2025; Zhang, 2021; Zhang & Lin, 2021). When vocabulary is measured and entered into the model first, as it is here, that indirect pathway has already been captured. What remains for MA to predict is only the direct morphological contribution that operates independently of vocabulary, and this study suggests that in an adult L2 undergraduate sample, that direct residual contribution is modest. Satori (2025) reached a comparable conclusion in a study of adult L2 learners across proficiency levels, finding that morphological knowledge's contribution to reading comprehension was highly dependent on the proficiency stage of the learner: at lower proficiency levels, morphosyntactic properties of morphology drove reading outcomes, but as vocabulary knowledge grew, the independent morphological contribution became harder to isolate. This is consistent with an interpretation in which the Pakistani undergraduates in the present sample — operating predominantly at self-reported B1–B2 proficiency — are at a point in their L2 development where vocabulary is the primary bottleneck, and morphological knowledge serves reading largely through the vocabulary it has helped build rather than through a direct structural parsing route that operates separately from lexical access. These findings should not be interpreted as evidence against morphology instruction.. If MA contributes to reading comprehension primarily by expanding and deepening vocabulary knowledge, then teaching morphology is still teaching something that feeds into reading ability — it just does so through a particular processing pathway rather than independently of vocabulary.

5.4 Situating the Findings in the Pakistani Educational Context

In addition, the results must be interpreted in the context of the Pakistani educational setting. According to what was mentioned earlier in Chapter 1, the participants of the current study were enrolled in universities following education systems that do not usually treat English language as a medium of instruction, meaning that English lessons have been focused more on vocabulary acquisition and grammar knowledge than on SA (Halo et al., 2024). Thus, the results of the analysis that SA predicts English reading comprehension uniquely and significantly can be interpreted not only from the viewpoint of psycholinguistics but also as a hint concerning what is taught poorly at the moment: whereas the Pakistani undergraduate participants of the experiment seem to be quite familiar with the vocabulary at the level of 2,000–3,000 frequency bands, the high bivariate correlation of MA and English reading comprehension, as well as the unique predictive power of SA, indicate that Pakistani students' syntactic competence in English may be weak and thus important to develop. To this effect, Ramzan and Alahmadi (2024), who investigated the influence of syntax-based writing instruction in Pakistan, have shown that Pakistani ESL writers become capable of writing more complex sentences when paying attention explicitly to syntactic structure. Although the current study does not prove the causality, its results suggest that Pakistani students can benefit from such writing instruction. Indeed, if syntactic awareness is proven to predict English reading comprehension uniquely and significantly in Pakistani students and syntax-based instruction can improve syntactic competence in L2 learners, it means that this form-focused approach is worth pursuing.

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5.5 Theoretical Contributions

The findings contribute to the L2 metalinguistic awareness literature in several ways. The first is comparative: by entering MA and SA simultaneously into a hierarchical regression model with vocabulary controlled, it provides a direct empirical comparison of their relative unique contributions in the same sample. This design addresses a gap explicitly identified by Liu et al. (2024), whose meta-analysis noted the scarcity of studies combining both predictors in a single framework, and the result — SA > MA in unique explanatory power — adds a data point to an emerging but still thin comparative literature. Second, this is the first study, to the researcher's knowledge, to examine the MA–SA–reading relationship in Pakistani Urdu-L1 undergraduates, a population with simultaneous L1 distance from English in orthography, morphological system, and canonical syntactic order. The finding that SA is a particularly strong independent predictor in this sample — plausibly because SOV-to-SVO syntactic remapping is a non-trivial processing challenge for Urdu-L1 readers — is not a finding that could have been generated by extrapolating from East Asian or Hispanic learner data. It requires data from this population specifically, and the study provides them. Finally, the pattern observed here — strong MA–reading bivariate correlation that attenuates substantially when vocabulary is controlled — is consistent with the morphological pathway framework's prediction that vocabulary mediates much of morphology's influence on reading in adult L2 learners (Satori, 2025; Zhang, 2021). By replicating this pattern in a new population and a new linguistic context, the study extends the ecological validity of the mediation account beyond the East Asian EFL samples in which it was first documented.

5.6 Pedagogical Implications

5.6.1 Prioritising Syntax Instruction in Academic English Programmes. The clearest pedagogical signal from these results is that syntactic awareness deserves explicit attention in English programmes at Pakistani universities. Present day courses of academic English in Pakistan's tertiary institutions concentrate on vocabulary learning, reading strategy teaching, and essay writing, whereas syntactic learning is usually restricted to correcting mistakes and not emphasized as a comprehension process in itself. In case SA contributes uniquely and significantly to predicting reading comprehension ability in such individuals, it becomes plausible to include systematic practice that fosters grammatical awareness, including such practices as sentence unscrambling, identifying and correcting mistakes, grammaticality judgement, and explicit parsing of complex sentences, like relative clauses, passives, and cleft sentences.

5.6.2 Morphology Instruction Through Vocabulary Integration. For MA, the implications are distinct in sort. The best pedagogical strategy is probably to incorporate morphological education into vocabulary instruction rather than teaching morphology as a stand-alone metalinguistic talent, since MA's contribution to reading appears to function mostly through vocabulary in adult learners. By highlighting the derivational ties between words, such as the shared root of "depend," "dependence," "dependent," and "dependability," as well as the fact that the suffix indicates grammatical category, students' lexical knowledge and morphological sensitivity are both strengthened. This method of teaching vocabulary is practically compatible with the time limits of academic English courses at universities and is well-supported by research on word-rich learning environments (Grabe & Stoller, 2020).

5.6.3 Curriculum Design Implications. These results imply that Pakistani university English programs might profit from a more linguistically explicit approach at the curriculum level, one that views grammatical structure as a reading aid rather than just a writing or speaking issue. A syntactic awareness component could be included to academic reading courses in addition to the more traditional emphasis on vocabulary growth and reading skills. A fruitful next step in converting this suggestion into particular course material would be needs analysis work with Pakistani undergraduates in many disciplines.

5.7 Limitations

The conclusions that can be derived from this study are qualified by four restrictions. The cross-

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sectional design is the first and most basic. Even with careful control, correlational evidence does not prove that learning MA or SA improves reading comprehension. The found predictive correlations may, in theory, indicate a third shared source that simultaneously promotes metalinguistic competence and reading ability, such as general L2 competency or cognitive aptitude.. Longitudinal or experimental designs are needed to adjudicate between causal and confound interpretations, and this study cannot do that.

The second limitation concerns the measurement of MA. The derivational suffix task used here — a meaning-based word relatives format — targets morphosemantic knowledge: knowing what suffixes mean and how they change grammatical category. It does not measure morphophonological sensitivity, morphological segmentation speed, or the ability to use morphological information in real-time word recognition. Different measurement approaches tap different aspects of the morphological awareness construct, and the study's finding about MA's unique contribution — or the absence thereof — is specific to the knowledge-based, consciously accessible dimension of MA. Studies using online morphological processing measures might find a different pattern.

Third, individual test conditions were not standardized due to the online, unproctored administration approach. It's still possible that some individuals got help, used dictionaries, or finished the battery under distracting conditions that wouldn't accurately reflect their unassisted language proficiency despite the response-time screening processes. Based on the information at hand, it is impossible to determine the degree of this contamination.

5.8 Directions for Future Research

Several lines of future inquiry follow directly from these findings and their limitations. The most pressing is a longitudinal study examining whether improvement in SA — through targeted instruction or naturalistic development — produces corresponding gains in L2 reading comprehension in Pakistani undergraduates. Without longitudinal or experimental evidence, the instructional recommendations in Section 5.6 remain theoretically motivated but empirically unverified in this population. A pre-test / post-test intervention study incorporating explicit syntax instruction as a treatment condition would be a productive and practically feasible next step.

Future research should also examine the mediation pathways more formally. The regression model used here established vocabulary as a control variable but did not model mediation explicitly. A structural equation modelling approach — comparable to those used by Zhang and Lin (2021) and Satori (2025) — would allow direct testing of whether vocabulary mediates the MA–reading relationship and whether SA has both direct and indirect (vocabulary-mediated) effects on comprehension in this population. That analysis would also speak more precisely to the question of whether MA and SA operate through distinct or overlapping cognitive pathways.

The typological distance hypothesis raised in Section 5.2 calls for a cross-L1 comparative study in which Pakistani Urdu-L1 learners and learners from typologically closer L1 groups — such as French or Spanish speakers — are assessed on the same battery. If SOV-to-SVO syntactic remapping amplifies the SA–reading association in Urdu-L1 readers specifically, that prediction should yield a statistically significant L1 group by SA interaction on reading comprehension, and its absence would be equally informative. More broadly, future research should include populations that remain underrepresented in the L2 reading literature: studies of L2 reading cognition in populations whose L1s are under-represented in the published literature. Theoretical claims about how metalinguistic sub-skills predict L2 reading are currently built on a narrow empirical base, and their generalisability to learners with different orthographic histories and typological profiles remains genuinely uncertain. This study has taken a small step toward addressing that uncertainty for Pakistani learners; a great deal of similar work remains to be done.

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5.9 Conclusion

This study set out to examine whether morphological awareness and syntactic awareness predict English reading comprehension in Pakistani L2 undergraduates, beyond what receptive vocabulary alone can explain. The findings showed that both morphological awareness and syntactic awareness contributed to reading comprehension beyond receptive vocabulary. However, the two constructs contributed differently. Syntactic awareness emerged as the clearer independent predictor in this sample, while morphological awareness's substantial bivariate association with reading appears to be channelled primarily through vocabulary rather than through a direct structural parsing route.

For Pakistani higher education specifically, the study identifies a linguistic dimension — syntactic processing competence — that is plausibly under-developed relative to vocabulary in learners transitioning from Urdu-medium schooling, and that has demonstrable and independent relevance to academic reading performance. Vocabulary instruction remains essential, and morphological instruction that deepens lexical knowledge has a clear role. But there is a case, based on this evidence, for giving syntactic awareness a more prominent and explicit place in university-level academic English programmes than it currently occupies. More broadly, the study demonstrates that the relationships between metalinguistic sub-skills and L2 reading outcomes documented in East Asian and Western learner populations also hold — with locally specific inflections — in a South Asian, Urdu-L1 context. That extension matters. If the goal of L2 reading research is to understand how people learn to read in a second language, the evidence base needs to be as diverse as the learners it aims to describe.

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