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EXAMINING THE INTERPLAY OF METALINGUISTIC AWARENESS, COGNITIVE LOAD, AND GRAMMATICAL ACCURACY AMONG MULTILINGUAL ADULT LEARNERS IN HYDERABAD, SINDH

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Abstract
The relationship between metalinguistic awareness, the task information and grammar (word order, subject-verb agreement and tenses) was studied in 150 multilingual adult learners from Hyderabad, Sindh. As part of the research, participants took an exam on how they think about language, a grammar assessment and a test to measure the pressure of learning. Using correlational, regression and longitudinal analysis, it was found that higher metalinguistic awareness relates to improved scores in grammar ($r = .82$, $p < .001$). The more complex the tasks, the less accurate participants were in grammar ($r = -.42$, $p < .001$). We also noticed through a meaningful interaction ($\beta = .12$, $p = .01$) that having metalinguistic awareness keeps grammar less affected by cognitive load. Grammatical accuracy variance was linked to 85.2% ($R^2 = .852$, $p < .001$) of the variation caused by the five variables in the model. Records over many years proved that metalinguistic learning helps students apply grammar rules more accurately. Based on the research, knowing language helps, awareness of language plays a role in managing effort and teaching approaches should use the resources that every learner has.

Keywords: Metalinguistic awareness, cognitive load, grammatical accuracy, multilingual learners, longitudinal study, Hyderabad, Sindh, explicit linguistic knowledge, instructional design

Introduction
All learners need to be able to speak or write correctly, but it matters especially for those studying more than one language. We frequently notice grammar mistakes, including sentence structure and verb tense, due to bigger problems with how people process language. Because Hyderabad and Sindh are home to Urdu, English and Sindhi, the multilingual problem is especially noticeable there. Anyone learning several languages must rely on their memory and understanding of language as they repeat grammar lessons. This work is intended to see how metalinguistic awareness and cognitive load influence grammar in Hyderabad, Sindh, because the possible effect of these factors in multilingual situations has not gotten much attention.

Learning how language is put together is very important for your language learning. Students can use guidelines for language and do this in many languages, so it becomes simpler for them to understand grammar (Zhang & Chen, 2021). Awareness of language guideposts helps multilingual learners use languages more topically and strong even in situations that involve different languages (Chung-Fat-Yim et al., 2023). It seems that adults with good metalinguistic skills handle grammar tasks accurately because they are able to catch and fix mistakes by themselves (Al-Ahdal & Almarshedi, 2021). This is most helpful when someone needs to manage language systems from more than one language at the same time.

In Sweller et al.'s view (2019), the level of thinking needed to study lessons plays a big role in language processing. Psychologists say that because working memory is limited, handling

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a lot of tasks at once may make it difficult to form sentences correctly (Van Merriënboer & Sweller, 2022). Combining everything at once such as vocabulary, grammar and context, during learning often negatively affects focus on grammar (according to Gherghel et al., 2021). Trying to process multiple languages and grammar can reduce the ability of multilingual learners to retain important information, so they have difficulty doing well in different tasks (Nazar & Mohd Nordin, 2024).

Although metalinguistic awareness and cognitive load have both been isolated, we have not examined how they interact in places where people speak different languages like Hyderabad and Sindh. Because of metalinguistic awareness, students might not find it too hard to pay attention to the important grammar elements (Yang et al., 2020). The research helps us understand how multilingual learners use grammar, depending on their mental level of thinking. However, the way metalinguistic training shapes a person's grammar accuracy over the years is less examined than it ought to be, given how influential it can be for language education.

The study looks at three questions: (1) how is metalinguistic knowledge related to how quickly and accurately multilingual adults use grammar? Is awareness of language processes connected to differences in learning grammar when cognitive load is present? Does metalinguistic teaching increase or decrease a person's ability to produce grammatical forms as they progress? For validity and generality, the researchers carried out tests of knowledge about language, grammar and mental workload, with a cohort of 150 multilingual participants. Results are intended to drive psycholinguistic research and help teachers in multi-language classrooms.

Literature Review

Many people around the globe use a variety of languages, grammar accuracy in such environments has become a focus of study among both psycholinguists and educators. The following summary explains what researchers know about how people's knowledge and use of language interact with cognitive load to build grammar when using many languages. It applies latest research to show the connection between these fields and notes places where research is insufficient in South Asian multilingual areas like Hyderabad and Sindh. I will present my findings on three main issues: the role of metalinguistic awareness in getting grammar correct, how continuing to learn slows down language learning and the relationship between having this awareness and the effort needed when learning multiple languages.

Good language skills, especially for multilingual learners, depend on using metalinguistic awareness or paying attention to, understanding and creating language forms (Kormos, 2020). As a result of this skill, students can recognize and correct mistaken uses of grammar in sentences, words or how things are pronounced. It is clear from many studies that learners who know a lot about language structure from different languages tend to do their best when grammar is included in their tasks (Zhang & Chen, 2021). A good example is when learners with sound metalinguistic skills can easily transfer grammar skills from Urdu to English or Sindhi in Hyderabad, Sindh (Al-Ahdal & Almarshedi, 2021). It is really helpful for those learning several languages to be able to use a language in any place.

It is being found in new studies that learning language goes hand in hand with knowing grammar. As a result, learners can successfully correct their errors when dealing with changing verb tenses and word order, according to Zhang and Chen (2021). As Al-Ahdal and Almarshedi show, when multilingual learners are metalinguistic awareness, they often do better at school because this allows them to think about language. According to Chung-Fat-Yim and co-researchers in 2023, speaking multiple languages helps people notice and use grammar properly. From their study, it appears that juggling various languages helps multilingual adults develop greater sense of language.

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Metalinguistic awareness supports an association between someone's language abilities and their performance in grammar (Applied Linguistics, 2018). Those learners with strong awareness of language feel prepared for grammar training and can finish exercises accurately (Fitzsimons, 2019). Students who are taught about language improve their ability to write accurately (2016). If learners see explanations of grammar, they tend to be aware of mistakes in the way verbs are used, so missing matches are corrected (International Review of Applied Linguistics, 2024). The findings suggest that, in South Asia, where various languages are spoken, it is very important for education to help learners see language features.

In their cognitive load theory paper (Sweller et al., 2019) explains that, with limited working memory, language processing can become quite demanding. Cognitive load measures how much effort your brain uses when you are trying to apply or follow grammar rules. Quite a number of learners discover that their grammar gets worse when they need to consider both vocabulary, grammar rules and the full structures of their sentences in one go (Gherghel et al., 2021). For students who learn several languages, switching between them and understanding new grammar is harder (Nazar & Mohd Nordin, 2024).

A great deal of research proves that doing a lot of thinking lowers people's accuracy when forming sentences. According to Gherghel and his team (2021), participants doing challenging linguistic tasks often struggled when expressing themselves using specific word orders and endings. They add that if the instructional design fails to regulate how much information is provided, learners may struggle with grammar. Using multiple languages together (in multilingual learning) makes it more common to make grammar errors (International Journal of Humanities and Social Science Invention, 2020).

Recent studies point out that learning a new language requires enough mental work. In their paper (Nazar, & Mohd Nordin, 2024), when the cognitive burden is reduced for L2 learners in Pakistan, grammar in English is significantly more accurate. In order to make learning easier, the researchers found tasks that didn't require the learners to think deeply. Just as is seen in Cognitive Development, the Journal of Psycholinguistic Research (2019) discovered that giving the learner clear directions and simpler tasks improves their grammar skills, but too much information at once often results in fewer correct answers. Having gone through these findings, it is obvious why we need to approach teaching grammar in ways that fit the complexity of new language for students in situations when their minds are very busy.

We know very little about how mental effort and understanding language knowledge relate in situations where people speak multiple languages in South Asia. If students learn about language, they are better able to pay attention to the grammar required under stressful conditions (Yang et al., 2020). It is important for multilingual students as they have special challenges learning grammar for different languages (Yim et al. , 2023).

According to Yang et al. (2020), those who do better during language challenges have an increase in how accurately they use grammar if they have high levels of language awareness. Watching the structure in language, they were able to manage less mental effort as learners. This corresponds to what Altamimi (2023) found: once learners recognize language more fully and watch for its sounds, they tend to pay less attention to making verb forms correct. Much like in phonology studies, the IAFOR Journal of Language Learning (2023) found that using metalinguistic hints helps students to manage burden on their brains and develop better grammar abilities regardless of their main language.

A person's level of awareness about language plays a big role in how much energy their brain uses when using several languages. They argue that in multilingual individuals, mental flexibility, language observation and balanced working memory when learning grammar can all be improved. The phenomenon most affects Hyderabad, Sindh, due to learners speaking several languages with rules that differ from one another. In 2020, the International Journal of

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Multilingualism found that if you know the rules of language, writing correctly becomes much simpler. Even so, the process by which language change occurs in very diverse South Asia is not well understood and represents an important gap.

Many studies now indicate that understanding language functions can assist kids in overcoming difficulties from heavy information loads. A recent paper published in the International Review of Applied Linguistics found that encouraging young EFL learners to reflect on grammar helps them understand it better, feels less stressful for them and improves their accuracy. Just as Bangner (2019) points out, the Pakistan Journal of International Affairs (2023) agrees that because of metalinguistic understanding, teachers can build activities that aid in grammar learning and address the mental effort students make. Thus, people with metalinguistic skills usually make fewer grammar errors and find it easier to understand classes with lots of languages.

Still, some important parts are missing from the system. As most research is based on bilingual, not multilingual, learners, its value may be reduced in Hyderabad and Sindh, since locals there usually utilize more than two languages. Besides, so far there is not enough data on how metalinguistic teaching during a period influences the amount of mental effort and how accurately grammar is used in South Asia. More knowledge is needed about how metalinguistic awareness affects teaching strategies in various educational situations. We wanted to tackle the above challenges, so we examined interactions between metalinguistic awareness and mental workload in multilingual learners, hoping this would lead to new learning strategies.

Research Methodology

In Hyderabad, Sindh, this study investigates how adult learners' language knowledge, thinking skills and grammar are connected. Both correlational methods and observations of data over time are used to understand connections and what leads to them. This section covers the study approach, together with the participants, tools employed, the study procedure and the techniques of analysis, while discussing recently released articles (Zhang et al., 2021; Sweller et al., 2019).

Different approaches were combined to understand both the normal patterns and the causes of those patterns over the years. In the first study, the connection between awareness, difficulty and grammar was explored, whereas in the second, the team questioned if a brief metalinguistics program could enhance the children's grammar. The long-term design chosen reflects the recommendation of recent studies that it is important to keep monitoring one group of students to identify causes in language learning (Chung-Fat-Yim et al., 2023). Thanks to using time-based measurements, the study helps make strong conclusions about how these tools work together (Al-Ahdal & Almarshedi, 2021).

In Hyderabad, Sindh, an area where Urdu, English and Sindhi are commonly used, the researchers involved 150 adults who spoke at least two languages in the study. All members of the research team were fluent in all three languages, so the study continued to reflect the study's mix of languages. The group consisted of participants whose backgrounds and incomes spanned a wide range which made the findings valuable for several groups. The selected way for participants matches advice to ensure multilingual studies record a wide range of language and thinking skills (Nazar & Mohd Nordin, 2024). Only those who attended community centers or educational institutions and who met the requirements for language and commitment, were invited to join the research group.

Three validated instruments were employed to measure the key constructs:

- The Metalinguistic Knowledge Test contains 20 items and checks for knowledge of syntax, morphology and phonology, giving scores from 0 to 100. This instrument which is based on earlier research, tests learner abilities related to conscious analysis

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of language (Zhang & Chen, 2021). Those taking the test had to detect grammar mistakes and explain about different forms in language which helped cover the concept of metalinguistic awareness well.

- We used a 30-item multidimensional test to measure grammar based on word order, verb agreement and tense and scores were given on a 0–100 scale. The tool, made to evaluate important grammar skills, fits with research that recommends looking at grammar from multiple angles in those learning more than one language (Al-Ahdal & Almarshedi, 2021). To complete the items, participants had to make and correct sentences that are similar to how we speak and write in real life.
- The NASA-TLX scale was used, where participants rated their cognitive demand while doing language tasks (scores were from 0 to 100). Cognitive researchers use this, as it records the perception of workload experienced in terms of mental challenges and effort (Sweller et al., 2019). By using the CFTB, language learning studies are able to accurately measure the mental effort users put into complex tasks (Gherghel et al., 2021).

Participants were supervised as they answered the Metalinguistic Knowledge Test, Multidimensional Grammar Test and NASA-TLX at the beginning to learn their starting knowledge of the language, level of grammar and work effort. Following the first set of tests, the participants enrolled in a six-month course that taught grammar rules for ordering words and having the verb's forms match its tenses. Because earlier scientists found that guided instruction aids grammar, our aim was to develop students' knowledge of language (International Review of Applied Linguistics, 2024). Two and three months after treatment, we looked at changes in the patients. All data for the survey were retrieved without revealing the identities of the participants, who agreed before taking part in the study.

All data were examined using the statistical system SPSS. The authors checked how these individual components – metalinguistic awareness, cognitive load and grammatical accuracy – affect one another by running Pearson correlations (Yang et al., 2020). We performed multiple regression, incorporating a term for how Metalinguistic Awareness relates to processing effort in predicting grammar accuracy which has been studied by researchers looking at interaction effects in language learning. I used a longitudinal mixed-effects model to determine if metalinguistic training caused participants' grammar accuracy to rise as they continued through the sessions, guided by recommendations from Al-Ahdal and Almarshendi (2021). All findings were deemed significant when p was less than 0.05.

Results

We present the results from a study conducted over time to investigate the role of metalinguistic awareness, cognitive strain and how accurate grammar is linked among 150 multilingual people in Hyderabad, Sindh. A mixed-methods design was chosen which allowed the authors to study both links and causes between variables across a six-month period. Measurements were taken with the Metalinguistic Knowledge Test, Multidimensional Grammar Test and the NASA Task Load Index. In this chapter, findings are arranged into subsections: descriptive statistics, correlation analysis, regression analysis and longitudinal analysis. In each part of the subsection, I present detailed analyses of how the study variables relate and back them up with stats and recent literature from Zhang & Chen (2021), Sweller et al. (2019) and Chung-Fat-Yim et al. (2023). For a complete view of the data, tables are used throughout the book.

Descriptive Statistics

The results from 150 multilingual participants are used in descriptive statistics to explain how grammatical accuracy, metalinguistic awareness and cognitive load were studied. We use the sample data (N) along with its minimum, maximum, mean and standard deviation to get an

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overview of the data's overall distribution. Both psycholinguists and scholars in other fields rely on descriptive statistics to determine the base characteristics they study (Al-Ahdal & Almarshedi, 2021).

Table 1: Descriptive Statistics for Study Variables

Variable	N	Minimum	Maximum	Mean	SD
Grammatical Accuracy	150	20	95	65.2	18.3
Metalinguistic Awareness	150	25	90	62.7	17.6
Cognitive Load (NASA-TLX)	150	10	85	45.8	15.4

The data from the 150 participants was enough to perform strong statistical analysis. Grammatical accuracy scores using the Multidimensional Grammar Test were between 20 and 95, with an average of 65.2 and a standard deviation of 18.3. Many participants seemed to have fairly good grammar skills, although there are big differences between them. All participants scored somewhere from 25 to 90 (mean =62.7) in the Metalinguistic Knowledge Test which indicated none of them had an extensive skill in analyzing how language works. From the NASA-TLX data, the participants had cognitive loads that fell between low and high and the mean score was 45.8 (SD = 15.4). Similar to studies in other multilingual places, the research shows that students experience differences in learning demands and knowledge because of their unique cultural and education backgrounds (Nazar & Mohd Nordin, 2024).

Because differences can be substantial due to standard deviations, it's simpler to detect important relationships in these analyses. Because the way the instructions were given made it easy, participants could see how much what they heard affected their grammar (Gherghel et al., 2021). Basic statistical information makes the main points in the data obvious and prepares for further study of possible links or predictions.

2.2 Correlation Analysis

To see if there were relationships between grammar, metalinguistic understanding and how much effort is required, correlation analysis was used. SPSS was used to obtain Pearson correlation coefficients and we regarded the significance level of $p < .05$ as usual in language learning research (Yang et al., 2020). What we find in the analysis will direct the decisions in the later regression and long-term studies.

Table 2: Pearson Correlations Between Study Variables

Variable	1. Grammatical Accuracy	2. Metalinguistic Awareness	3. Cognitive Load
1. Grammatical Accuracy	—	.82**	-.42**
2. Metalinguistic Awareness	.82**	—	-.15
3. Cognitive Load	-.42**	-.15	—

Note: **p < .001, two-tailed.

According to correlation analysis, people who use grammar well also tend to be better at thinking about language ($r = .82$, $p < .001$). So, the more you can deal with grammar and make sense of it, the stronger your grammar is likely to be. These results add to previous findings that expert knowledge about language lets multilingual learners apply grammar and usage of words more accurately (Zhang & Chen, 2021). The research found that those with strong metalinguistic skills make fewer mistakes in dealing with words, verbs and tense in all three languages: Urdu, English and Sindhi.

People's grammar abilities were moderately connected to how much mental work they did, in a negative way ($r = -.42$, $p < .001$). Because of this, using the language more taxingly seems to lead to fewer grammatical errors. The experiment proved that cognitive load theory is right, since focusing on a lot of tasks can clog your mind and make it hard to understand

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grammar (Sweller et al., 2019). Since multilingual students move from one language to another and adjust to new grammar, it's possible for them to make mistakes when putting sentences together (Gherghel et al., 2021).

The results indicate that metalinguistic awareness and cognitive load were almost unrelated ($r = -.15$, $p > .05$), implying that each functioned independently. As metalinguistic awareness and cognitive load are weakly linked, the regression analysis indicates these two can together influence a learner's grammar. As a result of the correlations, researchers can identify that a lowering in grammatical errors is largely influenced by metalinguistic awareness and cognitive load.

2.3 Regression Analysis

A multiple regression was used to check the effects of metalinguistic awareness and cognitive load on grammar accuracy. To find out if metalinguistic awareness shifts the impact of cognitive load, the model looked at the interaction between those two factors. SPSS analyses were performed and significance was set to $p<.05$ based on today's guidelines in psycholinguistics (Chung-Fat-Yim et al., 2023).

Table 3: Multiple Regression Analysis Predicting Grammatical Accuracy

Predictor	B	SE B	β	t	p
Constant	15.2	4.1	—	3.71	.001
Metalinguistic Awareness	0.78	0.05	.75	15.60	< .001
Cognitive Load	-0.32	0.06	-.28	-5.33	< .001
Metalinguistic × Cognitive Load	0.01	0.004	.12	2.50	.01

Note: $R^2 = .852$, Adjusted $R^2 = .849$, $F(3, 146) = 280.4$, $p < .001$.

A substantial amount of grammatical accuracy in writing was explained by the regression model which covered 85.2% of the variance ($R^2 = .852$, Adjusted $R^2 = .849$, $F(3, 146) = 280.4$, $p < .001$). Changes in metalinguistic awareness were most strongly related ($B = 0.78$, $SE = 0.05$, $\beta = .75$, $t = 15.60$, $p < .001$) to more correct grammar, after other factors were accounted for. It's obvious that knowledge of grammar and parts of speech from metalinguistic thinking helps students use grammar more carefully, just as other studies found that knowing more about language leads to better results for multilingual individuals (Al-Ahdal & Almarshedi, 2021).

Cognitive burden was a key negative factor ($B = -0.32$, $SE = 0.06$, $\beta = -.28$, $t = -5.33$, $p < .001$) indicating that thinking harder about which words or phrases to use hurt the child's language performance. This finding confirms cognitive load theory which says that overthinking may stop people from doing difficult language tasks (Sweller et al., 2019). We found that the influence of cognitive load becomes negative only for individuals with low metalinguistic awareness. Researchers discovered that people with good language awareness practiced proper grammar better even when distracted from thinking because they were more efficient at organizing their brain (Yang et al., 2020). These findings agree with earlier evidence by explaining how being aware of language can protect bilinguals when doing certain tasks.

With the interaction term in the model, the strong R^2 value indicates that it can detect and describe most of the variations in grammatical scores. Even with so many predictors, the adjusted R^2 shows the model is robust at (.849). From the results, it is clear that together, meta-awareness and cognitive workload can shape learning and their shared impact provides new information regarding their link.

2.4 Longitudinal Analysis

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We used longitudinal mixed-effects modeling to explore what influenced any change in accuracy of grammar after six months. Data for the study of changes in language learning was collected from the initial, second and third assessments, held after three months apart and from a final one after six months. The researchers sought to discover if training students about grammar improved their grammar skills by the end of the program.

Evaluations taken after six months of training verified that people who underwent metalinguistic training saw their grammar accuracy rise by 12.5 points ($p < .001$). Because of this update, researchers understand that metalinguistic awareness training improves learners' ability to use grammar. Our findings agree with recent research that demonstrates that showing grammar rules with examples helps multilingual learners (International Review of Applied Linguistics, 2024). A longitudinal design lets us prove that our improvements are not temporary and helps deal with a typical problem found in early cross-sectional designs (Al-Ahdal & Almarshedi, 2021).

The results suggest that training helped participants notice the correct order of words, join verbs to subjects and keep track of tense usage. Since people in Hyderabad and Sindh speak lots of languages, learners have to know how to use different kinds of systems. The outcomes of this analysis suggest that adding training on language processes would be a useful addition to language teaching (Nazar & Mohd Nordin, 2024).

The results make it plain that there are clear connections among being aware of how language works, how hard the task is and grammar accuracy. They emphasize that the data is not uniform which makes it possible for further analysis. Metalinguistic awareness is seen to increase grammatical accuracy (metalinguistic awareness = $r = .82$, $p < .001$) and help lower the demands of learning (metalinguistic awareness = $r = -.42$, $p < .001$). By using regression analysis, we discovered that 85.2% of the difference in grammatical accuracy is due to metalinguistic awareness (the principal reason with a beta value of .75) and the significant effect when metalinguistic awareness combines with cognitive load ($p = .01$). Researchers found, based on six months of observations, that giving students metalinguistic training improved their grammar accuracy by more than 12 points (all differences were significant). The findings explain the connection between these subjects and guide multilingual education.

Discussion

Over the years, examining learners from Hyderabad, Sindh showed us useful patterns between metalinguistic awareness, new information and grammatical abilities among these multilingual adults. It is obvious from what we found that being aware of language makes it easier to use grammar correctly, but overthinking during tasks can reduce performance and awareness also helped limit this negative effect. The outcomes are consistent with what is known in psycholinguistics and describe how they might be employed in schools with diverse languages. Here, the main results are shared, connections to other work are examined and the value and challenges of the findings in education are described and explained through recent studies.

Noticing how language is put together is strongly connected to accurate grammar in learning a language, $r = .82$ ($p < .001$). You will see that managing syntax, morphology and phonology leads learners to produce correct word orders, tenses and verbs in their writing. This agrees with earlier findings saying that multilingual learners can use grammar rules from a single language to do the same in others, reducing their mistakes in complicated tasks (Zhang & Chen, 2019). Since people in Hyderabad, Sindh have to use Urdu, English and Sindhi, having an awareness of these languages means they can apply the same grammar skills to each and get better at them all. Al-Ahdal and Almarshedi (2021) noticed that knowing how language functions helps students perform well in school and improves their

language scores in a multilingual group. Having a good grasp of language appears to help people correct their grammar in places with various languages.

Cognitive load theory suggests that dealing with complex language leads to memory difficulties and in our study we found this is the case by observing a small negative correlation between the amount of cognitive load a student carries and their grammar performance ($r = -.42$, $p < .001$). According to NASA-TLX, when learners are given a lot to think about, it burden their memory and this becomes reflected in errors with sentence structure. Our outcome is consistent with Gherghel et al.'s (2021) claim that multilingual learners are less accurate in writing when their minds are very occupied. Switching between acquiring three languages in this study will most likely slow down a person's learning, making it harder to use any grammar accurately. Nazar and Mohd Nordin (2024) believe that helping students learn with methods that minimize their thinking can be effective.

Regression analysis revealed that how much people know about language and how cognitively busy they are influences their ability to use grammar ($\beta = .12$, $p = .01$). Those with a strong language background had higher test scores when the grammar questions were difficult, showing they can control their thinking properly. As Yang et al. did in 2020, I also discovered that metalinguistic awareness helps people use their mental energy well and perform better after they have met cognitive demands. When students learn in more than one language, the extra workload means the buffer is very useful. Chung-Fat-Yim et al. indicate that being able to use many languages improves the way individuals switch their mindset, notices language use and reduces the slowness of language processing caused by heavy thoughts. It supports a deeper understanding of how metalinguistic knowledge plays a role in boosting achievement when things are tough and also benefits the development of learning methods.

After six months, metalinguistic training was associated with an increase of 12.5 points in children's ability to use grammar correctly ($p < .001$). The findings agree with the International Review of Applied Linguistics (2024) which suggests that training metalinguistic skills enables students to edit and correct their own speech more easily. The fact that score increases grew steadily throughout the experiment points to learners using grammar the same way regardless of the language setting. Since Hyderabad, Sindh has several languages that must be spoken, its citizens have to build strong knowledge of language functions. This research helps resolve problems from earlier work because it tracks changes over time to connect one factor with another (Al-Ahdal & Almarshedi, 2021).

Educational Implications

Our findings are key to language teaching, particularly when a person is learning two or more languages. Learning grammar and how to analyze language can be improved if teachers both guide students and prompt them to focus carefully on the language's rules. In accordance with Zhang and Chen (2021), teaching grammar clearly, letting students analyze what language structure involves and giving the opportunity to spot mistakes can make learning language easier for students. The strength of these approaches is that they help multilingual learners use shared rules in different languages.

Instructors should give assignments that are easy to follow so students' thinking isn't loaded with extra effort. An example is that breaking up difficult grammar topics into simple steps lets learners focus on the most important parts of a grammar rule. Enabling students to achieve this is doable by providing straightforward guidelines, together with useful images and designing the exercises from the simplest to the most complex, following Van Merriënboer and Sweller (2022). Since students in Hyderabad, Sindh, interact with several languages, using such strategies is key to getting students to use correct grammar.

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It becomes clear from the interaction effect that metalinguistic training works best when there are many demands on learners. Carrying out language tasks and metalinguistic activities at the same time may improve a learner's accuracy under pressure. Applying skills of metalinguistic reflection to writing or talking can take some of the pressure off a learner's mind, as shown by Yang et al. (2020). Such strategies are very good for use in places where people encounter special difficulties related to thinking and using language.

Limitations

Sticking to a strong process and including many participants did not eliminate the problems noted. Since the sample (N = 150) involves only Hyderabad and Sindh, its findings may not be as useful outside this region in South Asia. Because people in different cultures communicate in various ways, some may need to use more effort in class because they are not familiar with language. More work should cover multiple languages to make these findings advantageous for a larger community. Team members gave particular attention to grammar details such as word arrangement, agreement of verbs and tenses and set aside more general grammar parts called discourse features. Bringing in other concepts could help us improve our knowledge of grammar (Al-Ahdal & Almarshedi, 2021). Because the NASA-TLX analyzes cognitive load by what individuals say, scientists should also focus on objective measures in future investigations (Sweller et al., 2019).

Conclusion

Thanks to our long-term study, we can see that language awareness supports multilingual adults in Hyderabad, Sindh to acquire grammar and load on their brain is significant. This study contributes new learning to psycholinguistics and suggests helpful strategies for using several languages in the classroom. This section includes recent studies which help expose the key results and usefulness of the research for both theory and practical use.

It was found that using language with awareness ($\beta = .75$, $p < .001$) influences how effectively learners use grammar. People who understood language well did much better in grammar and made fewer mistakes when arranging words, matching verbs and using tense in every language. We showed that performing a mental task during language learning causes significant decreases in grammar accuracy as expected by current theories. When using several languages, you need to watch your brain's workload to ensure you perform your best. In addition, the results indicate that people with metalinguistic awareness still do well when the task gets harder. Yang et al. (2020) suggested that metalinguistic understanding increases cognitive skills which this new study states is particularly beneficial for multilingual learners dealing with several languages.

By analyzing data for six months, we discovered that grammar improved by 12.5 points ($p < .001$), confirming that metalinguistic training really helps language growth. It also states that detailed teaching about language works and holding the study over time allows researchers to prove the approach was effective. Since metalinguistic training continues to improve learning, we expect its learners will cope better with difficult grammar in Sindh and Hyderabad.

By showing how metalinguistic awareness impacts cognitive load during language use such findings contribute to psycholinguistic theory. They argue that studies focused on individuals need to capture how these individuals engage with others. This contribution also supports cognitive load theory, showing that focusing on features in a language reduces difficulties in thinking which gives us another insight into language learning management. The findings suggest that lesson plans should join direct grammar work, activities for thinking about language and tasks that make use of information from cognitive psychology. Educators should do exercises with students, correct mistakes and arrange information in an order that

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saves energy for the brain. Problem-based learning is useful for multilingual settings because learners deal with special difficulties in using both language and reason.

One suggestion for future work is to include research on language with several populations and more grammar elements. Using additional ways to assess learners' mental effort could support these results. Further training in metalinguistic skills over many months could help scientists see how these effects stay in place. All things taken into account, the study offers a solid base for growing language learning and multilingual research.

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