

Artificial Intelligence in Global World: A Case Study of Grammarly as e-Tool on ESL Learners' Writing of Darul Uloom Nadwa

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Abstract—Studies worldwide have explored how Grammarly as Electronic Tool (e-Tool) assists English as a Second Language (ESL) students in enhancing their writing. The present study aims to improve Madrasa ESL learners' writing by minimizing inflectional morphemes related errors at Darul Uloom Nadwatul Ulama in Lucknow, Northern part of India. The study participants included sixty-eight Madrasa students who were enrolled in Alimiyat (equivalent to 12th) grade and were formed into two separate groups: an experimental group was treated with Grammarly, while the control group got instruction using the communicative language teaching approach. The data was collected from all participants before and after the treatment. A quantitative approach was used to the analysis of the data. A repeated-measures two-way ANOVA test revealed that Grammarly enhanced ESL learners' writing for inflectional morphemes following treatment in the experimental group relative to the control group. These findings demonstrate how 'Grammarly' as an e-Tool may support ESL writers, especially novel writers who find it challenging to write well in English.

Index Terms—Artificial intelligence, automated response, error analysis, Grammarly as e-Tool, ESL writing

I. INTRODUCTION

The present study determines if Grammarly, as an Electronic Tool (e-Tool), is effective in enhancing English as a Second Language (ESL) learners' writing in India at the Darul Uloom Nadwatul Ulama for reducing errors. According to past studies, Grammarly could help ESL learners improve their English writing by reducing grammatical errors [1–5]. Therefore, the literature could be utilized as a source of inspiration for learning how Grammarly helps ESL students overcome their writing challenges.

However, very little research has focused on Madrasa ESL learners' writing errors made by students in the Madrasa setting. To address a lacuna in the literature, an experimental group with 'Grammarly' as an E-Tool intervention and a control group without intervention may commit substantially different ESL writing errors at Darul Uloom Nadwatul Ulama. The study raises significant concerns: 1) What type of errors do Madrasa students commit in English writing? and 2) how Grammarly as an E-Tool and communicative language teaching approach performs across the tests (pre and post) in

improving writing to minimize each type of inflectional morphemes-related errors over eight weeks? There has been no attempt so far: i) to analyze the ESL Learners' writing errors committed by Madrasa students, and ii) to investigate the efficacy of using Grammarly as an electronic tool in ESL students' writing with reference to the decrease of errors and the development of writing skills within the setting of a Madrasa. The study explores the instructional implications of providing ESL students with Grammarly feedback to decrease writing errors. The study covered language development into consideration in order to eliminate inaccuracies. The findings are significant for educators, indicating what should be taught and what tactics and processes their students should use to acquire a second language.

A comparative study adopts an experimental method to analyze various writing errors. The objectives of the study are: in the first phase, Darul Uloom Nadwatul Ulama Madrasa ESL learners' writing errors were examined regarding their categories related to inflectional morphemes. In the second phase, it was determined whether or not Grammarly and CLT were beneficial in helping madrasa ESL students improve their writing in the sense that they made less error in their writing. This study addresses the following questions:

- What types of errors did Darul Uloom Nadwatul Ulama Madrasa students make in their writing?
- How does the Grammarly and Communicative Language Teaching Approach improve ESL learners' writing by minimizing each type of inflectional morpheme-related error?

II. BACKGROUND

Darul Uloom Nadwatul Ulama and Deoband are considered one of the important Madrasas in India. Darul Uloom Nadwatul Ulama was founded in 1891 and started with balanced and moderate courses. The pre-requirements to enter or to enrol in the Darul Uloom Nadwatul Ulama is a unified exam which is conducted by 'All India Madrasa Board' (this exam is equivalent to board exam). Around 5000 students are studying in Darul Uloom Nadwatul Ulama. This Madrasa's purpose is to cope with the modern education system through religious and scientific study. Therefore, they do not only teach the Quran and Hadith but also general sciences, as well as English as a second language. They have designed their curriculum based on religious and scientific study focusing on the job market. Although students are taught only general subjects, they can easily seek employment in the government and private sectors. The

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students of Nadwa are working in various diverse fields in India.

At Darul Uloom Nadwatul Ulama, students are taught English to facilitate communication. English is taught using a structured curriculum at Darul Uloom Nadwatul Ulama. The curriculum's focuses language topics taught in preparation for examinations. Although they pass their exams, teachers of Darul Uloom Nadwatul Ulama are concerned about enhancing their students' writing skills. However, the students were being taught employing traditional methodology which does not incorporate modern praxis of AI tools in the classroom pedagogy. Thus, in the current study, the automated correction software 'Grammarly' is implemented as a unique teaching tool in the context of Darul Uloom Nadwatul Ulama to investigate how students may improve their writing skills in terms of error reduction. In previous studies automated correction software 'Grammarly' was found more effective than other type of software/tool in solving issues related to ESL learners' writing [1, 6] and minimizing errors [7]. Additionally, an analysis of error was found more effective through grammarly than human [8, 9]. Alam *et al.* [10] study suggests various activities through which one can reduce the mistakes and grasp the nuances of different skills of language. The implications of the results for future study and instructional practice are examined.

A. Grammarly Software

Grammarly, AI-powered English writing software, detects language-related problems. Grammarly offers several editing features that could be helpful for learners. First, it provides immediate feedback to the learners to revise the document; second, it underlines and classifies mistakes with distinct colours for replacement; third, it offers a metalinguistic explanation for mistakes; fourth, it offers options for a variety of English; fifth, it provides a performance report; sixth, it provides a rating to the learners based on corrections and recommendations underlined in the document.

B. Effectiveness of Grammarly in Error Correction

The usefulness of Grammarly in improving writing skills among ESL students has been the subject of various research conducted by a number of scholars. Since studying the whole body of literature is impossible, only the most relevant studies have been appraised and included. Previous studies have confirmed Grammarly's overall efficacy in enabling error correction [11, 12]. The software 'Grammarly' is a valuable tool for correcting the writing process [13, 14]. Students may benefit from this in several ways, including a reduction in the number of errors they make and an improvement in the overall quality of their writing [1, 3, 15–17].

III. LITERATURE REVIEW

A. Background of Error Analysis

Speech and writing performances can be evaluated by employing the Error Analysis (EA) theory proposed by Corder [18]. Corder considers that it is convenient in the analysis of learners' language inaccuracies. According to Brown [19], this facilitates learners as a remedial approach in the process of learning the structure of the target language.

EA provides a framework for the syllabus designer and teacher to follow while developing a remedial course for target language learners [18]. Teachers or educationists of the target language can employ Corder's framework [20] to enhance language proficiency to determine the occurrences of frequent errors and understanding levels. ESL and EFL oral or written faults were categorised by Richards [21] and Richards and Schmidt [22] as overgeneralization, simplification, developmental, communication, and overproduction, respectively. In addition, Corder [20] demonstrated that although developmental EA highlights a language learner's successive transitional languages, remedial EA aims to facilitate teachers for assessment and correction. Richards and Schmidt classifications is not in line with Corder's developmental EA, which focuses on the learner's successive transitional languages. The primary goal of Corder's EA is to inspire educators, practitioners, and researchers to comprehend how errors made by learners lead to language development in L2 acquisition and to develop pedagogy.

B. Previous Studies on ESL Writing Errors

Many studies have analysed ESL writing errors made by different language speakers. This study included studies that are relevant to the current study. Within the context of error analysis, Manihuruk [23] examined the inflectional morpheme errors committed by 30 students during the third semester of ESL writing. In ESL writing, he mentioned that students had removed, substituted, and added the incorrect inflectional morpheme. Additionally, a study conducted by Sunandar [24] on Indonesian (L1) speakers found ESL writing errors with inflectional affixes. According to his findings, learners made more errors while using the plural affix '-s' than other types of inflectional morphemes related errors. Furthermore, an experimental study was carried out by Gardner *et al.* [25] to examine the ESL speech and writing errors made by Mandarin (L1) speakers. He revealed that students had the most significant trouble with the present (3rd person singular -s) and past (-ed) inflections in their writing. Additionally, Dewi *et al.* [26] found errors in the use of inflection morphemes in Indonesian speakers' ESL writing. They revealed the results that the intralingual impact led the learners to omit, add, and misuse inflection morphemes in their ESL writing. Moreover, an investigation was carried out by Florianus and Syamsi [27] to look at inflectional affixation errors in eight freshmen's ESL writing. Due to the structural variation of English, Florianus and Syamsi [27] noted in their research that learners were having trouble with subject-verb agreement, plural, and past participle. Al-Saidat [28] focused on the inflectional morphological errors made by Arabic as a first language (L1) speaker in writing English. The study identified eight different kinds of inflection-related morphemes errors in ESL writing. Investigation into the contributing factors for the errors revealed that 51.3% were developmental and 39.7% were interlingual.

IV. METHODOLOGY

A. Participants and Sampling

The participants in this research were chosen using a

process of convenience sampling. The researcher uses convenience sampling because it is practical, affordable, and easily accessible to the sample [29]. Therefore, the present study used a convenience sampling method because students' presence was required in the classroom. Action research is a kind of systematic study that uses spiral design cycles consisting of planning, action, observation, and reflection [30, 31]. It enables educators or teachers to concentrate on classroom dynamics and enhance the teaching and learning process.

Alimiyat (equivalent to 12th grade) grade 68 male ESL students at Darul Uloom Nadwatul Ulama Madrasa participated in the experimental research. Alimiyat (equivalent to 12th grade) grade was the criteria for selection because students have learned and understood English for more than six years [32]. There were 35 computers in language learning lab but one computer was not working properly, therefore, 34 students have participated in the experimental study. Purposive sampling divided the participants into two groups of 34 students. It was anticipated that the participants that they would study English once a week for a total of four hours. Two intact groups were used: one for the control group ($N = 34$) and another for the treatment group ($N = 34$). All participants in both groups were familiar with using computers and navigating the internet. Learners who participated in this study had a common first language (i.e., Hindi-Urdu). Before the start of the present research, the participants had already been studying English for close to 10 years on average. The researcher also took on the role of teacher for both groups so that any potential differences in instruction could be observed and managed. Before the students took part in the research, we made sure to get their permission after providing them with enough background information.

B. The Study Activity of Experiment Group and Control Group

During the first week, experimental group participants were instructed on creating an account with Grammarly and using its commercial edition. The experiment was carried out over eight weeks, with each session in the classroom for duration of ninety minutes. This study has focused on eight inflectional morphemes, therefore, conducted for eight-weeks. They were assigned a subject to write an essay in English on from the second to eight weeks [forty-two days excluding Friday (weekend off) and Gazetted holidays]. Before they could start using Grammarly, they were required to disable the spelling and grammatical autocorrect feature available in Microsoft Word as a matter of policy and practice. Students were also instructed not to ask for their teachers' or classmates' assistance while finishing their assignments.

The experimental group engaged Grammarly to verify the essay writing they produced for linguistic correctness, and they revised their own work in response to Grammarly's editing recommendations throughout the experiment (36 revisions were made). In addition, the students had to examine every modification Grammarly offered, albeit they were allowed to ignore those they felt went too far. Students were encouraged to understand the metalinguistic explanation and the differences between their output and the

right form. The review task also allowed students to determine which revisions to approve or reject based on their materials. Every day, the experimental group students used to send in their revised versions of their writings as well as the Grammarly report. Notably, no accuracy ratings were assigned to these essays. The teachers used the structured curriculum for teaching ESL for the control group. Students have been teaching English through a communicative language teaching approach in the classroom.

C. Data Collection Procedure

Data were collected from the experimental and control groups on the 43 days in the form of essays on three distinct topics on Microsoft word-file on individual computers for evaluation purposes. The students were required to produce 200–300 words essay without the use of any reference tools, such as dictionaries. Microsoft Word's autocorrect, spelling, and grammar tools had to be disabled.

D. Data Analysis Procedure

The errors in this study were found and categorized using the EA method proposed by Corder [20]. In order to detect inflectional morpheme errors, collected data was uploaded to Grammarly (Grammarly was determined to be more successful in the assessment of ESL writing of learners in recent research) [8, 9]. The data was then labeled per Dulay *et al.* [33] Surface Structure Taxonomy, and inclusion, exclusion, and false information were used. The following types of errors were then specified and assigned according to inflectional morphemes.

The Statistical Package for the Social Sciences (SPSS) version 22 was used in this research to analyze the collected data. Repeated measures ANOVA (Analysis of Variance) tests were used in the analysis for both the groups and tests.

V. RESULTS

A repeated measure three-way ANOVA factor on the frequency of errors of types of errors \times two groups (experimental and control) \times two tests (pretest and post-test) showed the main effect of the type of errors was significant, $F(1, 33) = 112.328$, $P = 0.001$, $\eta^2p = 0.967$, entailing the results that Madrasa students made eight types of error with different frequency (Table I). This analysis shows that the Madrasa students committed eight types of inflectional morphemes-related errors in their writing. The highest error was found related to past tense (-ed) outperformed plural (-s), third-person singular present (-s), progressive (-ing), possessive (-'s), past participle (-en), comparative (-er) and superlative (-est). Additionally, the statistical analysis showed a significant main effect of groups, $F(1, 33) = 141.436$, $P = 0.001$, $\eta^2p = .811$, which demonstrated the results that the total mean of the errors was higher ($M = 3.053$, $SD = 0.130$) for the control group in comparison to the experimental group ($M = 2.458$, $SD = 0.117$). This analysis demonstrates that Grammarly positively affects the experimental group by reducing $M = 0.594$, $SD = 0.013$ mean of errors in improving the ESL learners writing. Further, the main effect of tests, $F(1, 33) = 42.727$, $P = 0.001$, $\eta^2p = .728$, showing a higher mean of errors for the pretest ($M = 3.022$, $SD = 0.131$) than post-test ($M = 2.645$, $SD = 0.118$). After the

intervention, the learners improved their writing by decreasing $M = 0.377$ and $SD = 0.013$ the mean of errors. The interactional effect between the types of error \times the group was significant, $F(1, 33) = 57.218$, $P = 0.001$, $\eta^2p = 0.679$, exhibits the results that learners have a lesser mean of errors for the experimental group in comparison to the control group

(Fig. 1). The intervention of Grammarly has improved writing in terms of minimizing errors for past tense (-ed), plural (-s), third person singular present (-s), progressive (-ing), past participle (-en), and superlative (-est) except for possessive and comparative (Table I).

TABLE I: DESCRIPTIVE STATISTICAL ANALYSIS OF THE VARIATIONS ACROSS TESTS FOR EXPERIMENTAL AND CONTROL GROUP

Types of Errors	Experimental Group						Control Group					
	Pretest		Posttest		Gain		Pretest		Posttest		Gain	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
third person singular present (-s)	4.353	0.246	3.353	0.183	1.000	0.062	4.765	0.246	4.765	0.246	0.000	0.000
past tense (-ed)	6.029	0.309	4.676	0.298	1.353	0.011	6.324	0.285	6.059	0.301	0.265	-0.016
progressive (-ing)	3.176	0.233	2.088	0.195	1.088	0.038	3.471	0.251	3.471	0.251	0.000	0.000
past participle (-en)	1.500	0.224	1.059	0.158	0.441	0.067	1.588	0.224	1.588	0.224	0.000	0.000
plural (-s)	5.176	0.312	3.118	0.307	2.059	0.005	4.882	0.298	5.088	0.294	-0.206	0.004
possessive (-'s)	1.765	0.203	1.412	0.243	0.353	-0.040	1.676	0.206	1.029	0.248	0.647	-0.042
comparative (-er)	1.676	0.206	0.824	0.251	0.853	-0.046	1.029	0.248	1.029	0.248	0.000	0.000
superlative (-est)	0.794	0.178	0.588	0.159	0.206	0.019	0.794	0.178	0.794	0.178	0.000	0.000
Total	24.471	1.910	17.118	1.794	7.353	0.116	24.529	1.936	23.824	1.990	0.706	-0.054

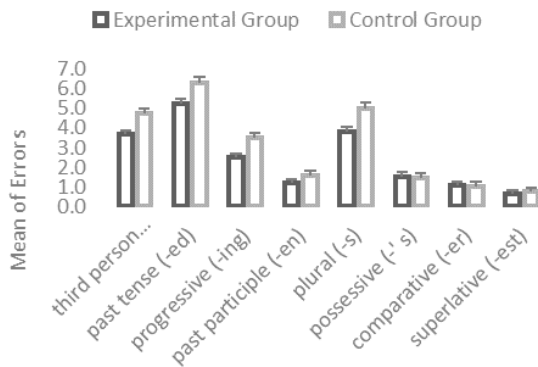


Fig. 1. The mean score for each type of error for both the experimental group and the control group.

Moreover, the interaction between the types of errors \times tests was showing significant, $F(1, 33) = 2.222$, $P = 0.050$, $\eta^2p = 0.548$, a result which entails that learners have reduced the writing errors after the interventions (Fig. 2).

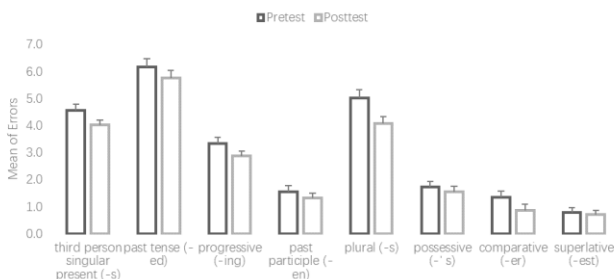


Fig. 2. The mean score for the pre and post-test for each type of error.

Further, the interaction between groups \times tests were significant, $F(1, 33) = 62.418$, $P = 0.01$, $\eta^2p = 0.796$, entails the results that the Madrasa learners have enhanced their writing by minimizing errors of post-test for the experimental group than the control group (Fig. 3).

Moreover, the interaction between types of errors \times groups \times tests was significant, $F(1, 33) = 4.788$, $P = 0.001$, $\eta^2p = 0.748$, showing the results that ESL learners have improved

their writing by reducing each type of inflectional morpheme-related error after the intervention of Grammarly for the experimental group than the control group of Communicative Language Teaching (CLT) (see Table I).

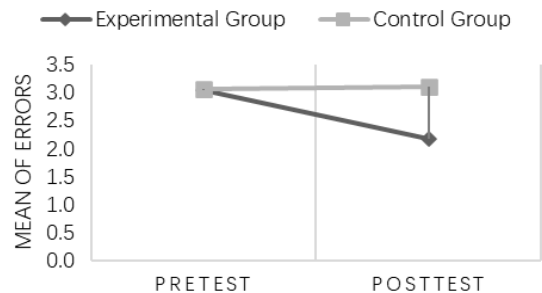


Fig. 3. The mean score for the groups and tests.

VI. DISCUSSION

Darul Uloom Nadwatul Ulama students made eight types of inflectional morphemes-related errors with varying frequencies. The findings of the study show that the madrasa students made eight types of errors (see Appendix A for example) related to the inflectional morphemes in the following categories: (i) past tense (-ed), (ii) plural (-s), (iii) third person singular present (-s), (iv) progressive (-ing), (v) possessive (-'s), (vi) past participle (-en), (vii) comparative (-er), and (viii) superlative (-est). The current findings are similar to Sunandar's [24], Made Pramestia Dewi *et al.*'s [26], and Al-Saidat's [28] study findings. The first and third types of present and past tense errors were found in the omission of inflection morpheme '-ed' and '-s' from the verb in both groups, wherein the experimental group made a fewer error rather than the control group. Similarly, the error was found with past participle (sixth type of error) by adding and omitting the morpheme '-ed' incorrectly instead of '-en.' These results are consistent with other research [34, 35], which suggests that verb tense (present and past) errors were most common among speakers of Arabic, Turkish, Chinese,

and Indonesian as their first language. However, the students' weak command of the present and past tenses is evident from their ESL writing errors in both classes. Hindi has no suffixes that change verb categories based on tense [36]. Errors in verb tense could result from inadequate knowledge of L2. Thus, L1 interference in ESL writing is responsible for these inaccuracies. Moreover, the second type of error committed by students related to inflection morpheme '-s' for making a noun plural in ESL writing. In Hindi, a single noun is usually constructed as a noun following numbers; hence, intralingual caused these errors in both groups [36]. In other words, nouns are pluralized after numbers in Hindi. Our current finding is dissimilar to [27], Dhar's [37] study findings. Likewise, the fifth type of error students made related to inflection morpheme '-s' for possessive, where no difference was found for experimental and control groups (Fig. 3). The deletion of the possessive '-s' in Madrasa students writing errors of two groups accredited to the first language transfer because this function of possessiveness is not presented in learners' first language [36]. Sawalmeh in his study concluded that intralingual was the sole source of errors for Arabic (L1) students [38]. The findings of this research contradict Sawalmeh's [38] findings concerning the sources of errors. Furthermore, the fourth type of error committed by students related to the inflectional morpheme '-ing' for progressive. Additionally, the fourth type of error in omission of inflection morpheme '-ing' was found in both classes for progressive. This error could be the influence of intralingual. Moreover, the seven and eighth type of error was found in the omission of morpheme '-er' and '-est' for the comparative and superlative degree. However, Hindi has a postpositional feature for comparison [36], and such construction does not exist in English. Therefore, first-language transfer errors arose when madrasa students translated the acquired rule of Hindi into English. The study's findings are similar to Chan's [39] study.

The experimental group and the control group made significant differences, with the experimental group making fewer errors as a result of the intervention of Grammarly compared to the control group. The investigation revealed that those students who had been given access to Grammarly performed significantly better on the post-test to correct errors than those who had been assigned to the control group. However, the findings of this study is in line with some recent studies into automated corrected writing software i.e., Grammarly [5, 11, 12], which stated that Grammarly has impacted on learners' ESL writing improvement in terms of reduction of grammatical errors. With the help of the

Grammarly, the learners' ESL writing considerably improved in the revised version.

The outcomes of the current study have shed some light on the typical sorts of inflectional morphemes-related errors made by students at Darul Uloom Nadwatul Ulama Madrasa. However, intralingual and interlingual transfer prohibited learners from producing grammatically correct sentences. To encounter the problem there are several studies available which elaborate upon how different strategies and techniques can be used in real life classroom pedagogy to overcome errors and mistakes in writing [40–43]. The ESL learners of Madrasa significantly improved their writing after the intervention of Grammarly in the experimental group in comparison to the control group of CLT. The highlighted features suggested that Grammarly might be used effectively to assist ESL students at Darul Uloom Nadwatul Ulama in enhancing their writing abilities by reducing errors in the classroom and outside of it. Moreover, the studies [44–49] findings and results are in line with the present study which foregrounds the pedagogical issues of motivation amongst learners', use of online and blended module in language learning and its challenges, learners' issues, and especially writing issues of ESL learners [50–54].

VII. CONCLUSION AND IMPLICATION

This study lends credibility to using the grammar-checking software Grammarly to enhance ESL learners' writing abilities. This experimental study confirms that Grammarly may be a beneficial exercise to improve students' writing abilities in the classroom. Considering the results of this research, we anticipate that instructors will be able to give students a wider variety of language learning tactics that use Grammarly in language learning classrooms and beyond, enabling them to reach their full potential.

Challenges had been encountered by the researcher during conducting research i.e., technological backwardness of the students, insufficiency of basic infrastructure and unfamiliarity with software. Furthermore, researchers may conduct experimental research including variables related to age and gender. Additionally, researchers can include different linguistic aspects for learning of English writing in future.

APPENDIX

TABLE AI: ERRORS COMMITTED BY STUDENTS IN ESL WRITING. ASTERISK*

S. No.	Types of Errors Committed	Groups (Experimental and Control)	Example of Committed Errors by Students
1.	past tense (-ed)	Experimental Group (Omission)	I was slap * my friend harder for the bad behavior. (I slapped my friend harder for the bad behavior.)
		Control Group (Omission)	We were * always perform * better in the class tests and main exams. (We always performed better in the class tests and main exams.)
2.	plural (-s)	Experimental Group (Omission)	We wish Eid Mubarak to everyone and hug three time *. (We wish Eid Mubarak to everyone and hug three times.)
		Control Group	It is enjoyed in many country * worldwide. (It is enjoyed in many countries)

		(Omission)		worldwide.)
3.	third-person singular present (-s)	Experimental (Omission)	Group	When Eid come* , everyone wake* up early in the morning. (When Eid comes, everyone wakes up early in the morning.)
		Control (Omission)	Group	Everyone enjoy* their day in Eid. (Everyone enjoys their day in Eid.)
4.	progressive (-ing)	Experimental (Addition)	Group	I see elephant when we was gone to the school. (I saw an elephant when we were going to the school.)
		Control (Omission)	Group	All the kids in the class are go on the field trip
5.	possessive (-' s)	Experimental (Addition)	Group	At my friend* home, we always prepared for Eid. (At my friend's home, we always prepare for Eid.)
		Control (Omission)	Group	After the Eid festival, we went to Hamid and Rehan* home. (After the Eid festival, we went to Hamid and Rehan's home.)
6.	past participle (-en)	Experimental (Addition)	Group	We are* eated* many dishes at my friend house. (We had eaten many dishes at my friend's house.)
		Control (Omission)	Group	My mother and father was forget* give money Eidy all friends. (My mother and father had forgotten to give money as Eidy to all the friends.)
7.	comparative (-er)	Experimental (Addition)	Group	My hometown city is not big than lucknow but beautiful. (My city is not bigger than Lucknow but beautiful.)
		Control (Omission)	Group	My hometown is very big* than other cities in uttar pradesh. (Mumbai is bigger than other cities in Uttar Pradesh)
8.	superlative (-est)	Experimental (Omission)	Group	The ganga is long river in the city. (The Ganga is the longest river in the city.)
		Control (Omission)	Group	My city has Qutub minar and is long* tower in my hometown Delhi. (My city has Qutub Minar, which is the longest in my hometown Delhi.)

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Dr. Sohaib supervised the whole research development and took the lead in writing the manuscript. Dr. Sohaib and Mr. Mohammad Usama developed the theoretical formalism and wrote the manuscript with support from Dr. Ismat Jabeen and Mr. Moshabbir, Dr. Farhan. All authors provided critical feedback and helped shape the research, analysis, and manuscript.

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