JURNAL EDUSCIENCE (JES)
p-ISSN : 2303 - 355X | e-ISSN : 2685 - 2217
PUBLISHED BY : LPPM of UNIVERSITAS LABUHANBATU

Visualizing Syntax: The Effectiveness of Tree Diagram-Based Sentence Parsing in Addressing Structural Ambiguity in EFL

Siska Bochari[1], Hastini[2]

[1,2]Faculty of Teacher Training and Education, Tadulako University, Indonesia
*E-mail: siska.bochari@gmail.com

ARTICLE INFO

Keywords:
Syntax Tree Diagrams
Structural Ambiguity
EFL Syntax Instruction
Sentence Parsing

ABSTRACT

Purpose – This study explores how syntax tree diagrams can help English as a Foreign Language (EFL) students better understand sentences that can be interpreted in multiple ways due to their structure. Structural ambiguity often confuses EFL learners, who may struggle to see how a sentence could have different meanings. While ambiguity in language is not new, there has not been much focus on practical ways to teach students how to deal with it.

Methodology – Employing a pre-experimental one-group pretest-posttest design, this study involved 35 fifth-semester English Study Program students at Tadulako University. Participants received six sessions of instruction using syntax tree-based sentence parsing. Data were collected through a pretest, a post-test, and a structured questionnaire. The data were analysed using descriptive statistics and paired sample t-tests to determine whether the method had a significant impact.

Findings – The findings verified that students developed better skills to understand ambiguous sentences. The post-test scores exceeded pretest scores, and students demonstrated improved abilities to recognize how different sentence arrangements produce different meanings. The questionnaire results confirmed that students developed increased confidence through the syntax tree method, which helped them understand sentence structure.

Contribution – This research demonstrates that visual tools, such as a syntax tree, provide valuable benefits for teaching English syntax to students. This research demonstrates that showing students sentence structure through visualization helps them understand complex grammar rules better. The findings present practical information for teachers who want to develop better classroom methods for teaching ambiguous sentence structures.

Received 02 June 2025; Received in revised form 10 June 2025; Accepted 10 October 2025
Jurnal Eduscience (JES) Volume 12 No. 5 (2025)
Available online 30 October 2025

INTRODUCTION

The learning of English as a Foreign Language (EFL) faces ongoing difficulties with language ambiguity, which affects academic and formal communication settings. The structural complexity of sentence ambiguity, particularly syntactic ambiguity, creates ongoing comprehension problems for language learners (Fromkin et al., 2022; Lee et al., 2025). Solving syntactic ambiguity requires students to understand sentence structure and the hierarchical organization of sentence components (Saleh & Hasan, 2021; Zapata-Leal & Ávila-Portuanto, 2021).

Some previous research findings present different theories about what causes this learning challenge. The main reason behind student difficulties with sentence structure, according to Ali et al. (2023), stems from their inadequate knowledge of phrase structure rules. However, Khan et al. (2020) and Nurlatifah & Yusuf (2022) identify vocabulary and grammar knowledge as essential linguistic obstacles. Students face additional challenges in understanding complex prepositional structures because their vocabulary knowledge remains limited, according to Zapata-Leal & Ávila-Portuanto (2021). This indicates that syntactic ambiguity needs multiple educational approaches to address its various aspects. Students face two main difficulties when learning syntax because they must identify sentence components and understand how different sentence arrangements create multiple meanings (Carnie, 2021). Students also face multiple difficulties understanding key syntactic concepts because they lack sufficient knowledge about phrase structure, constituency, and grammatical functions (Ajaj, 2022; Roberts, 2023).

The problem of sentence structure identification persists, according to observations made at Tadulako University during a syntax course in 2024. Many students misinterpret sentences containing structurally ambiguous constructions, producing inconsistent tree diagrams and conflicting syntactic analyses. This finding aligns with (Ali et al., 2023) but also reveals a local context-specific pattern where students avoid complex relative clauses and prepositional phrase attachments, a tendency scarcely addressed in current EFL syntax pedagogy.

One typical example of structural ambiguity often encountered by students is the sentence *"I saw a man with a telescope."* This sentence can yield two interpretations: *"I used a telescope to see the man"* or *"I saw a man who had a telescope."* The following syntax tree diagrams visualize how different syntactic attachments can generate these distinct meanings.

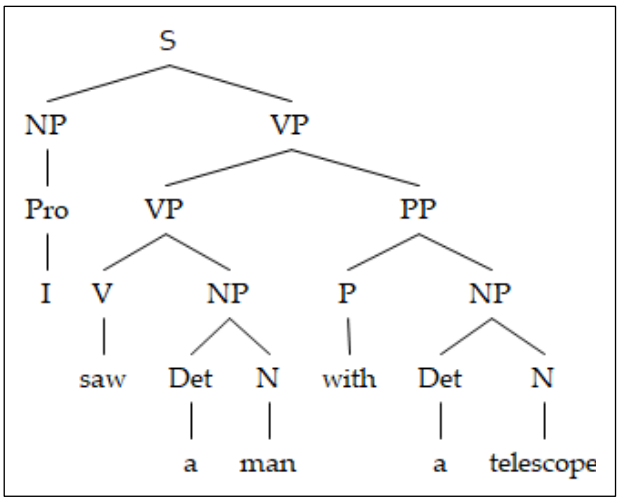

Figure 1. I used a telescope to see the man

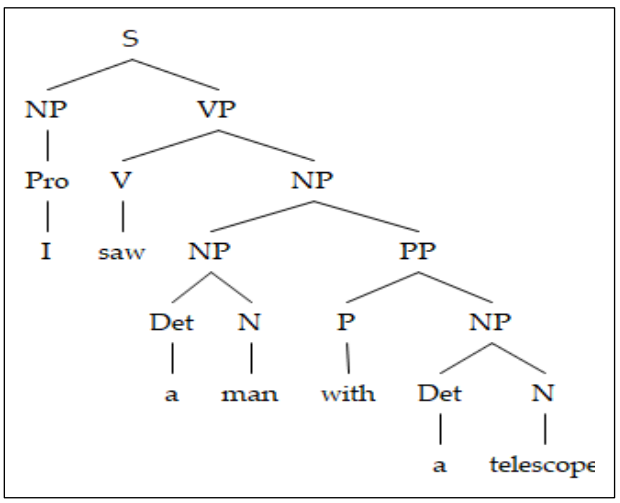

Figure 2. I saw a man who had a telescope

These diagrams clearly illustrate how structural ambiguity arises and how different parsing decisions lead to divergent interpretations, a difficulty repeatedly observed in student analyses at Tadulako University.

Recent studies increasingly suggest that syntax trees can be a helpful tool for improving sentence comprehension. The studies by Fei et al. (2020), Mrini et al. (2021), and Bai et al. (2021) prove that visualizing syntactic structures helps both computational models and human language processing systems to understand content better. The research by Bai et al. (2021) indicates that Syntax-BERT's design for NLP systems demonstrates its value for teaching students to understand complex sentences through explicit syntactic organizations. However, the existing research by Zhang (2022) and Tallerman (2025) focuses on using syntax trees for grammar education but does not address how to teach EFL learners to resolve ambiguity.

The current EFL syntax teaching methods fail to address this important educational need. The application of syntax trees as tools for EFL syntax teaching to detect and resolve ambiguity has not received sufficient investigation, although these trees enhance grammatical understanding. Moreover, the study by Nakamura et al. (2020) revealed that EFL students struggle to link their syntactic analysis to pragmatic-discourse signals, which form a vital cognitive process for ambiguity resolution. The pedagogical use of structural knowledge for L2 ambiguity resolution in a second language learning environment remains underdeveloped, according to Roberts (2023).

This research aims to provide theoretical insights and practical solutions to this educational problem. This research extends syntactic parsing theory by investigating how syntax tree diagrams help students parse sentences to identify and solve structural ambiguity in an EFL learning environment. The study also develops an integrated visual instructional approach for teaching syntax ambiguity resolution, which lacks implementation in current Indonesian EFL teaching methods.

This study's findings introduce new insights that distinguish them from previous studies in multiple ways. This research investigates structurally ambiguous sentence resolution in EFL syntax instruction, which stands as a specific area that previous studies by Ali et al. (2023), Winarta & Rahmanu (2020), and Amna (2021) have not fully addressed. The current research builds upon previous studies by creating and testing a classroom strategy that directly uses syntax tree diagrams to tackle student syntactic analysis problems.

In addition, the research by Bai et al. (2021) demonstrated how Syntax-BERT and other computational parsing models enhance natural language processing for complex sentence interpretation, yet their work focused on artificial systems. In contrast, this study investigates how visual parsing tools help EFL students achieve better results in analyzing and solving ambiguous sentence structures while extending parsing techniques from artificial systems to the human learning process. Furthermore, this study focuses on syntactic structural awareness as the primary mechanism for handling multiple sentence interpretations, while Zapata-Leal & Ávila-Portuanto (2021) emphasized vocabulary knowledge for prepositional phrase interpretation.

Finally, different from (Nakamura et al., 2020), who highlighted the difficulty EFL learners experience when integrating syntactic parsing with discourse-pragmatic cues in real-time processing, this study presents an alternative approach by visualizing structural relationships through syntax tree diagrams. This method enables students to solve ambiguity through systematic syntactic analysis rather than depending on intuition or discourse context. This research contributes distinctly to EFL syntax instruction, enhancing theoretical knowledge and teaching methods in the field.

By filling this empirical and instructional gap, the study seeks to answer: 1) What difficulties do English Study Program students face in understanding structurally ambiguous sentences? 2) How can sentence parsing through syntax tree diagrams assist in identifying and comprehending ambiguous sentence structures?

The research findings will create a practical teaching method for EFL students to learn syntactic ambiguity resolution while advancing theoretical applications of syntactic parsing for educational syntax disambiguation. In the long term, this research aims to develop EFL syntax teaching through an integrated visual approach that teaches interpretation skills, which students need for advanced academic reading, precise writing, and real-time communication.

METHODOLOGY

Research Design

This study employed a pre-experimental one-group pretest-posttest design to examine the effectiveness of sentence parsing using syntax tree diagrams on students' comprehension of ambiguous sentences. The research was conducted in one class of English Study Program students at Tadulako University. The sentence parsing-based instruction used tree diagrams to help students detect and solve ambiguous sentences by showing them how sentences connect syntactically. This research used sentence parsing-based instruction as its independent variable to measure how well students understand ambiguous sentences. The researchers used pretest and post-test assessments to evaluate students' progress in understanding ambiguous sentences. The researchers used a test to evaluate student performance and a questionnaire to understand their views about sentence ambiguity and their experience with sentence parsing.

Participant

This research involved 35 undergraduate students from the English Study Program at Tadulako University between 20 and 22 years old. All participants had finished Introduction to Linguistics and Advanced Grammar courses, which provided them with the necessary syntactic knowledge for this research.

This research employed purposive sampling according to (Creswell & Creswell, 2023) for educational studies with a limited scope that focuses on particular learner groups. The researchers selected participants through this method because it enables them to pick people who meet the essential criteria to fulfil research objectives.

This research established specific participant criteria for selecting suitable respondents to help achieve the study goals. The participants of this research needed to be third-year English Study Program students because they had already studied enough syntax analysis fundamentals. Additionally, all participants completed both Introduction to Linguistics and Advanced Grammar courses, which are prerequisites for understanding syntactic structures and ambiguity. Furthermore, the participants joined this research because they were willing to participate. They promised to finish all research stages, from pretest through instructional intervention to post-test and post-test activities. This research design used purposive sampling to pick participants who had equivalent syntax knowledge because this method enabled the researchers to measure how syntax tree diagrams help students solve ambiguous sentences.

Data Collection

The research data collection process included two primary instruments: a test and a questionnaire. The data collection spanned three distinct stages. During the preparation stage, the researchers created a pretest and a post-test to assess ambiguous sentence understanding while developing a questionnaire to record student feedback about their learning process. The pretest evaluated student comprehension in the implementation stage before the three-week sentence parsing-based instructional period started. The post-test followed the treatment to assess student progress. The test data received additional support through a questionnaire that students completed right after the post-test to share their understanding of the instruction and the challenges they encountered. In the final data collection stage, all relevant data, including pretest and post-test scores and questionnaire responses, were compiled for analysis to assess the impact of the instructional strategy on students' syntactic comprehension.

Instrument

This study employed two main instruments: a test and a questionnaire. The assessment included pre- and post-tests to determine student performance in finding and understanding ambiguous sentences. The students needed to mark the ambiguous parts of each sentence in the test while creating syntactic tree diagrams to

demonstrate alternative interpretations. The post-test took place after the students received three weeks of intervention. The test scores confirmed whether the students had developed improved skills to understand ambiguous sentences.

In addition, a structured questionnaire was developed to explore students' difficulties in understanding ambiguous sentences and their perceptions of sentence parsing. The questionnaire contained four sections: (1) Respondent demographics (name, age, and semester), (2) Types of difficulties in understanding ambiguous sentences (5 items using a 4-point Likert scale), and (3) Effectiveness of sentence parsing in understanding ambiguity (5 items using a 4-point Likert scale. The students used the Likert scale from 1 (Strongly Disagree) to 4 (Strongly Agree) to express their opinions. After the post-test, the researchers distributed the questionnaire to obtain student feedback about the sentence parsing instruction.

Data Analysis

The researchers used quantitative methods to analyse data obtained from tests and questionnaires. The test data received summary analysis through mean and standard deviation calculations, which showed students' achievement levels. The paired sample t-test evaluated treatment success by comparing pretest and post-test scores, which measured student progress from one time point to another. Additionally, the questionnaire data, which consisted of structured, closed-ended items, were processed using tabulation in Microsoft Excel. The responses were converted into percentage distributions to identify patterns and trends in students' perceptions, difficulties, and attitudes regarding sentence parsing. All statistical analyses for the test data were performed using SPSS.

FINDINGS

The research findings stem from analysing data obtained through tests and questionnaires. The assessment included pretest and post-test sections to evaluate students' ability to identify and understand ambiguous sentences before and after sentence parsing instruction. In addition, a structured questionnaire was distributed to students to understand their learning process, their challenges with syntactic ambiguity, and their thoughts about sentence parsing as a learning strategy. The following sections present and analyse test scores and results of the questionnaire responses.

The following sections demonstrate the pretest and post-test results, which underwent statistical analysis to establish the effectiveness of the treatment. The researchers used descriptive statistics and paired sample t-tests to evaluate student performance changes after the intervention.

Table 1. Paired Sample Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	51.6280	35	21.64261	3.65827
	Post-test	76.1200	35	27.96966	4.72773

The paired sample data in Table 1 present descriptive statistics that compare student performance before and after the treatment. The pretest scores averaged 51.63 points with a standard deviation of 21.64, which showed students had average initial abilities. After the sentence parsing instruction, the mean score increased to 76.12, with a standard deviation 27.97. This rise in the average score suggests a notable improvement in students' performance. However, the larger standard deviation in the post-test implies greater variability in how students responded to the instruction—some may have improved significantly. In contrast, others may have progressed more modestly. The standard error of the mean for both tests (3.66 for the pretest and 4.73 for the post-test) shows the level of precision of the mean estimates. Overall, these descriptive data indicate that the treatment may have positively impacted students' understanding of ambiguous sentence structure.

Table 2. Paired Sample Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest-Posttest	-24.492	36.0952	6.10120	-36.89113	-12.09287	-4.014	34	.000

The paired sample t-test evaluated student performance changes by analyzing their pretest and post-test scores after receiving sentence parsing instruction. The post-test scores exceeded pretest scores by -24.49 points according to Table 2 results. The standard deviation of the difference was 36.10, and the standard error of the mean was 6.10, which showed that students' score differences spread out at a moderate level. The 95% confidence interval for the mean difference ranged from -36.89 to -12.09, meaning we can be 95% confident that the actual average difference in scores lies within this range, and importantly, this range does not include zero, which supports the presence of a statistically significant difference. The t-value was -4.014 with 34 degrees of freedom, and the p-value (Sig. 2-tailed) was .000, which is less than the conventional threshold of .05. Therefore, we can conclude that the difference in scores between the pretest and post-test is statistically significant.

The pretest and post-test results provided quantitative data, but student responses during both assessments revealed their syntactic analysis abilities and understanding of ambiguous sentences. The following example demonstrates how students developed their parsing methods after receiving specific instruction about sentence ambiguity.

The students lacked understanding sentence structures that produce multiple interpretations during the pre-treatment assessment. They consistently drew one syntax tree diagram for ambiguous sentences with prepositional phrases after objects because they treated these phrases as adverbial adjuncts that modified verb phrases. They failed to recognize that the exact phrase could serve as an adjectival adjunct to modify the noun phrase.

The example above shows that the students demonstrated restricted knowledge about English structural ambiguity in their responses. However, they developed the ability to identify ambiguous structures when prepositional phrases followed objects after receiving specific instruction about ambiguity detection. They learned to draw two tree diagrams showing the two possible interpretations of the sentence. They developed better syntactic analysis abilities and better understood how sentence organization affects meaning.

The observed changes in student performance match the statistical results, showing improved test scores and enhanced syntactic understanding. To further exploration, they completed a structured questionnaire after the post-test to identify their challenges with ambiguity and their experiences with it.

The following section presents the results of the questionnaire, which were designed to explore students' difficulties in understanding ambiguous sentences and their perceptions of sentence parsing. The questionnaire responses provide valuable insights that complement the test findings and offer a deeper understanding of students' experiences during the learning process.

Table 3 presents the respondents' perceptions regarding the difficulties they experience when interpreting ambiguous sentences. The data indicate several important patterns:

Distinguishing meaning in ambiguous sentences

Over half of the respondents (51.4%) agreed that they often find it challenging to differentiate meanings in ambiguous sentences, while 42.9% disagreed. A small percentage (5.7%) strongly agreed. This suggests that semantic ambiguity presents a significant challenge for the participants.

Understanding syntactic structure

Similarly, 57.1% of respondents agreed that understanding the syntactic structure in ambiguous sentences is difficult, with 37.1% disagreeing and 5.8% strongly agreeing. These findings imply that structural or grammatical ambiguity also constitutes a notable issue.

Distinguishing between types of ambiguity

42.9% of respondents agreed on word meaning ambiguity. In comparison, another 42.9% disagreed, and 14.2% strongly agreed about sentence structure ambiguity, showing that respondents hold different opinions about ambiguity source because they have varying levels of experience with ambiguous languages.

Identifying the source of ambiguity

More than half (54.3%) disagreed that they struggle to identify which word or phrase causes ambiguity, while 37.1% agreed and 5.7% strongly agreed. This suggests that while many respondents feel relatively confident locating the ambiguous elements, a considerable portion still faces difficulties in this area.

Need for strategies or tools

60% of respondents agreed on the necessity for strategies or tools to understand ambiguous sentences. In comparison, 22.9% strongly agreed, but 17.1% of respondents did not agree with the statement, demonstrating that most respondents need additional resources to help them solve ambiguous sentence interpretation.

Table 3. Types of Difficulties in Understanding Ambiguous Sentences

No	Statements	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)
1	I often find it challenging to distinguish meanings in ambiguous sentences.	0	42.9	51.4	5.7
2	I find it challenging to understand the syntactic structure in ambiguous sentences.	0	37.1	57.1	5.8
3	I am confused when distinguishing between ambiguity due to word meaning and ambiguity due to sentence structure.	0	42.9	42.9	14.2
4	I find it challenging to identify which phrase or word causes ambiguity in a sentence.	2.9	54.3	37.1	5.7
5	I need strategies or tools to understand ambiguous sentences better.	0	17.1	60.0	22.9

The findings in Table 3 show that students face several main challenges when interpreting ambiguous sentences. Firstly, most respondents testified to difficulties when trying to identify multiple possible interpretations in ambiguous sentences. Secondly, students reported difficulties understanding the syntactic structure of ambiguous sentences, suggesting that structural ambiguity is a significant source of confusion.

Another prominent difficulty is the ability to differentiate between ambiguity caused by word meaning (lexical ambiguity) and ambiguity resulting from sentence structure (syntactic ambiguity). The data revealed that students are relatively divided in this area, indicating inconsistent awareness or skill in recognizing these distinct types of ambiguity.

Additionally, some students experience difficulty in identifying which specific word or phrase causes the ambiguity within a sentence. While several respondents feel capable of locating ambiguous elements, a substantial proportion still struggles with this task.

Lastly, there is a strong indication that students require effective strategies or tools to help them better comprehend ambiguous sentences. Most respondents expressed a clear need for supportive methods, underscoring the importance of instructional intervention in language comprehension. The data discovered that students faced several problems when dealing with ambiguous sentences, including identifying multiple

possible meanings, understanding syntactic structures, and distinguishing between lexical and syntactic ambiguity. In addition, many faced problems identifying which words or phrases create sentence ambiguity. These findings reveal that students require structured teaching methods to learn practical techniques for handling ambiguous sentence structures.

Table 4. The Effectiveness of Tree Diagram-Based Sentence Parsing Assisting the Comprehension of Ambiguous Sentences

No	Statements	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)
6	Tree diagram-based sentence parsing helps me understand how words in ambiguous sentences are syntactically connected.	0	5.7	68.6	25.7
7	After using syntactic tree diagrams, I find it easier to identify the sources of ambiguity in a sentence.	0	5.7	71.4	22.9
8	I feel more confident analysing ambiguous sentences after learning tree diagram-based sentence parsing.	0	14.3	68.6	17.1
9	Tree diagram-based sentence parsing helps me better understand the syntactic structure of English sentences.	0	2.9	80.0	17.1
10	Tree diagram-based sentence parsing is more effective than conventional teaching methods in comprehending ambiguous sentences.	0	5.7	68.6	25.7

Table 4 above presents that respondents found tree diagram-based sentence parsing more and more effective for understanding ambiguous sentences. The findings confirm that all statements received positive feedback from the respondents: (1) Understanding syntactic connections in ambiguous sentences is a respondent who answered agree that using tree diagram-based sentence parsing helps them understand syntactic connections in ambiguous sentences reached 68.6%. In comparison, those who answered strongly agreed were 25.7% The use of diagrams to show sentence structures enables students to understand syntactic relationships effectively. (2) Identifying the source of ambiguity, after applying syntactic tree diagrams, 71.4% agreed and 22.9% strongly agreed that they find it easier to identify the sources of ambiguity in sentences. This reflects the practical usefulness of the technique in isolating problematic elements within complex syntactic structures. (3) Increased confidence in sentence analysis, regarding confidence in analysing ambiguous sentences, 68.6% of respondents agreed and 17.1% strongly agreed, while only 14.3% disagreed. These results indicate that most students improved their analytical abilities after tree diagram-based parsing. (4) Understanding English syntactic structures in general, 80% of respondents agreed, and 17.1% strongly agreed, that tree diagram-based sentence parsing improved their understanding of English sentence structure. This technique helps students develop syntactic awareness in addition to solving ambiguity problems. (5) Effectiveness compared to conventional methods, of the respondents, 68.6% agreed and 25.7% strongly agreed that tree diagram-based sentence parsing outperforms traditional teaching methods for ambiguous sentence comprehension. According to the respondents, the visual and analytical method proves superior to traditional teaching methods.

The findings suggest that incorporating syntactic tree diagram-based sentence parsing can meaningfully support students in recognizing and understanding the structure of ambiguous sentences. Through this approach, students reported that they could better visualize how words within a sentence are syntactically connected, making it easier to detect the specific facts where ambiguity arises.

Most respondents declared that syntactic tree diagrams helped them find sentence ambiguities more easily. Besides, this method helped students become more confident in their competence to analyse complex sentence structures and improved their understanding of English syntax.

Additionally, students perceived tree diagram-based sentence parsing as a more effective instructional method than conventional learning strategies for interpreting ambiguous sentences. The diagrammatic representation of sentence elements through visual structures helped students understand complex syntactic relationships better, which improved their analytical abilities and reduced their confusion. The method proved effective for students because it showed word relationships in confusing sentences, helped them locate ambiguity sources, and boosted their skills in complex sentence analysis. Furthermore, it proved superior to conventional grammar instruction because it helped students understand English syntax better, and they found it more effective for handling their language learning. Based on these results, this research indicates that teaching students to parse sentences through tree diagrams leads to better comprehension and analysis of syntactic ambiguity in their language learning.

DISCUSSION

The findings of this study confirm that students who study sentence parsing through syntax tree diagrams become better at understanding English sentences with structural ambiguity. The paired samples t-test results show that visual parsing tools improve syntactic understanding and reduce ambiguity in EFL students' comprehension. This result supports the educational benefits of visual grammar teaching, which (Pavey, 2010; Wang, 2010) previously proposed, but (Bai et al., 2021; Ali et al., 2023) have now proven through modern research.

When compared to previous studies, this research introduces multiple important differences. The main challenge for EFL students in syntactic analysis, according to Ali et al. (2023), arises from their lack of understanding of phrase structure rules and constituent identification. However, their study did not evaluate particular teaching approaches for solving the problem. In contrast, this research applies visual parsing as an instructional method to measure its impact on student comprehension and ambiguity detection skills through quantitative assessment.

Similarly, the research of Khan et al. (2020) and Zapata-Leal & Ávila-Portuanto (2021) demonstrated that students' limited vocabulary and inadequate grammar skills affect their ability to understand written texts. However, both examined these variables independently without developing integrated syntax-based solutions for teaching. This research demonstrates that syntax tree-based sentence parsing helps students identify sentence meaning through structural indicators, which works even when vocabulary knowledge is restricted, according to Roberts (2023) and Williyan (2022).

Additionally, the research of Nurlatifah and Yusuf (2022) revealed ongoing difficulties for Indonesian EFL students in sentence analysis, yet it did not include experimental methods or practical teaching approaches. The current research fills this gap by establishing a new method to teach ambiguity resolution through experimental testing, which produces quantitative and qualitative assessment results.

This research also extends the study from Nakamura et al. (2020), establishing that EFL students face challenges when they need to process syntactic information with pragmatic and discourse elements. Using a syntax tree diagram, this research introduces it as an instructional tool that helps students handle structural ambiguity before processing contextual or pragmatic information. This two-step parsing system represents a new teaching method not tested before in Indonesian EFL education.

Based on these comparisons, the novelty of this research lies in two interrelated aspects that both improve and cover the scope of existing research. First, this research extends the educational application of syntax tree diagrams for EFL students to teach them how to identify and solve sentence-level ambiguity problems. It fills a knowledge gap because previous studies about syntax tree diagrams in language instructions from (Huang, 2019) and (Dzakiah & Asmawati, 2023) focused on improving students' syntactic understanding and grammar skills, but did not use them to teach ambiguity resolution in EFL syntax comprehension. This present research develops a new educational approach that uses syntax tree diagrams to teach students how to identify and solve sentence-level ambiguity problems, which remain challenging in EFL syntax comprehension. It enhances the educational value of the syntax tree by turning it into a visual tool that helps students solve complex sentence ambiguities.

Second, this research investigates the effectiveness of this method in an Indonesian EFL classroom setting, which lacks sufficient experimental syntax research. The studies by Ali et al. (2023) and Williyan (2022) described Indonesian EFL students' syntactic analysis and ambiguity problems, but they did not test or implement specific teaching methods. This research uses experimental classroom data to evaluate sentence parsing with syntax tree diagrams, expanding existing studies while providing new evidence-based findings for EFL instruction in local contexts. It also provides evidence-based teaching methods for EFL classrooms in Indonesia, which both build upon previous studies and adapt them to local educational needs. This research aims to enhance theoretical knowledge about second language acquisition and syntax parsing and to develop better syntax teaching methods for Indonesian higher education institutions.

In relation to the urgency identified in the introduction, this research demonstrates that syntax tree diagrams effectively solve the problem of ambiguous sentence interpretation, which EFL students face because of their inadequate parsing abilities and insufficient teaching methods. The post-intervention results indicate that students better understood and developed skills to detect ambiguous sentence elements. The results match those of (Bai et al., 2021), who demonstrated through Syntax-BERT that explicit sentence structure presentation enhances language processing effectiveness, although their research involved computational systems instead of human learners.

This research produces important results that have both academic and educational value. Pedagogically, it presents an easily reproducible teaching approach showing how to use visual parsing methods in syntax. Theoretically, it expands syntactic parsing theory by showing that sentence parsing functions to create sentence structure and resolve ambiguous meaning, which current EFL grammar teaching methods fail to address (Roberts, 2023). Additionally, this research supports (Tallerman, 2025) by showing that EFL students need explicit syntactic awareness training to develop their reading and writing skills at advanced levels.

For future education practice, this research demonstrates that visual education methods create better reading skills, writing precision, and discourse understanding abilities, which students need for global academic engagement (Lee et al., 2025). It also generates possibilities to create interactive digital parsing tools for EFL students, which build upon the Syntax-BERT model (Bai et al., 2021).

CONCLUSION

This research established that EFL students studying sentence parsing through syntax tree diagrams better comprehend ambiguous sentences. The substantial progress in post-test scores proved that visual syntactic analysis enables students to identify various interpretations better and decode intricate sentence patterns.

Theoretically, this research supports the theoretical framework by demonstrating that visual parsing methods enhance students' ability to recognize syntax and solve ambiguous sentences. It provides teachers with an effective teaching method to handle the ongoing problem that EFL students face when learning syntax. This research supports the implementation of visual parsing tools in EFL syntax syllabi at Indonesian universities to develop students' parsing abilities for complex academic writing.

However, the restricted number of participants and the one-group design prevented the researchers from coming to general conclusions about the results. Future research should expand its participant base and use experimental methods to study syntax tree-based instruction through digital interactive platforms.

In conclusion, integrating syntax tree diagrams in EFL teaching creates a promising approach to improve students' grammar understanding and their complete linguistic competence.

REFERENCES

Ajaj, I. E. (2022). Investigating the Difficulties of Learning English Grammar and Suggested Methods to Overcome Them. *Journal of Tikrit University for Humanities*, *29*(6), 45–58. https://doi.org/10.25130/jtuh.29.6.2022.24

Ali, S. W., Bay, I. W., & Mufatiroh, I. (2023). Syntactic Tree Diagram: Students' Problems and the Causes.

International Journal of English Linguistics, Literature, and Education (IJELLE), *5*(1), 68–76. https://doi.org/doi :10.32585/ijelle.v5i1.3717

Amna, S. (2021). An Analysis of Syntactical Errors and Mistakes Found in English Oral Presentation. *Lesson Journal: Language, Applied Linguistics, and Education Journal*, *3*(1), 9–12. https://doi.org/10.35134/jlesson.v3i1.1

Bai, J., Wang, Y., Chen, Y., Yang, Y., Bai, J., Yu, J., & Tong, Y. (2021). Syntax-BERT: Improving Pre-trained Transformers with Syntax Trees. *Proceedings of the 16th Conference of the European Chapter of the Association for Computational Linguistics: Main Volume*, 3011–3020. https://doi.org/https://doi.org/10.18653/v1/2021.eacl-main.262

Carnie, A. (2021). *Syntax: A Generative Introduction* (Fourth Edition). Willey-Blackwell.

Creswell, J. W., & Creswell, J. D. (2023). Research Design. In *SAGE Publications* (6th Edition). SAGE Publications.

Dzakiah, & Asmawati, N. (2023). Fostering EFL Students' Performance in English Syntax through Syntactic Tree Diagram Application. *LETS Journal of Linguistics and English Teaching Studies*, *4*(2), 91–99. https://doi.org/10.46870/lets.v4i2.523

Fei, H., Ren, Y., & Ji, D. (2020). Improving Text Understanding via Deep Syntax-Semantics Communication. *Findings of the Association for Computational Linguistics Findings of ACL: EMNLP 2020*, 84–93. https://doi.org/https://dx.doi.org/10.18653/v1/2020.findings-emnlp.8

Fromkin, V., Rodman, R., Hyams, N., Amberber, M., Cox, F., & Thornton, R. (2022). *An Introduction to Language: Australian and New Zealand 10th Edition*. Cengage.

Huang, D. (2019). The Potential of Sentence Trees in English Grammar Teaching. *English Language Teaching*, *12*(3), 178. https://doi.org/10.5539/elt.v12n3p178

Khan, R. M. I., Shahbaz, M., Kumar, T., & Khan, I. (2020). Investigating Reading Challenges Faced by EFL Learners at the Elementary Level. *Register Journal*, *13*(02), 277–292. https://doi.org/10.18326/rgt.v13i2.277-292

Lee, S. Y., Scheinberg, R., Shore, A., & Agrawal, A. (2025). Who Relies More on World Knowledge and Bias for Syntactic Ambiguity Resolution : Humans or LLMs ? *Proceedings of the 2025 Conference of the Nations of the Americas Chapter of the Association for Computational Linguistics: Human Language Technologies*, *1*, 3484–3498. https://doi.org/https://doi.org/10.18653/v1/2025.naacl-long.177

Mrini, K., Farcas, E., & Nakashole, N. (2021). Recursive Tree-Structured Self-Attention for Answer Sentence Selection. *Proceedings of the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing*, 4651–4661. https://doi.org/https://doi.org/10.18653/v1/2021.acl-long.358

Nakamura, C., Arai, M., Hirose, Y., & Flynn, S. (2020). An Extra Cue Is Beneficial for Native Speakers but Can Be Disruptive for Second Language Learners : Integration of Prosody and Visual Context in Syntactic Ambiguity Resolution. *Frontiers in Psychology*, *10*(January), 1–14. https://doi.org/10.3389/fpsyg.2019.02835

Nurlatifah, L., & Yusuf, F. N. (2022). Students ' Problems in Writing Analytical Exposition Text in EFL Classroom Context. *English Review: Journal of English Education*, *10*(3), 801–810. https://doi.org/http://doi.org/10.25134/erjee.v10i3.6633

Pavey, E. L. (2010). *The Structure of Language: An Introduction to Grammatical Analysis*. Cambridge University Press.

Roberts, I. (2023). Phrase-Structure Rules and Constituency Tests. In *Beginning Syntax* (pp. 51–77). https://doi.org/10.1017/9781009023849

Saleh, Y. M., & Hasan, S. H. (2021). *Linguistic Ambiguity of Modification*. *26*(2), 227–235. https://doi.org/https://doi.org/10.5281/zenodo.4678886

Tallerman, M. (2025). *Understanding Syntax* (6th Edition). Routledge.

Wang, Q. (2010). Drawing Tree Diagrams: Problems and Suggestions. *Journal of Language Teaching and Research*, *1*(6), 926–934. https://doi.org/10.4304/jltr.1.6.926-934

Williyan, A. (2022). Language Ambiguity in EFL Learners' Narrative Texts: A Semantic Discourse Analysis.

LET: Linguistics, Literature and English Teaching Journal, *12*(2), 352–369. https://doi.org/http://dx.doi.org/10.18592/let.v12i2.7439

Winarta, I. B. G. N., & Rahmanu, I. W. E. D. (2020). Students' Syntax Error in Making English Conversation: An Error Analysis Study. *Yavana Bhasha: Journal of English Language Education*, *3*(2), 19–26. https://doi.org/10.25078/yb.v3i2.1708

Zapata-Leal, C. E., & Ávila-Portuanto, M. C. (2021). Linguistic Awareness of the Prepositional Phrase Complexities in the English as a Foreign Language Context. *Revista Electronica Educare*, *25*(2), 1–17. https://doi.org/10.15359/ree.25-2.29

Zhang, Y. (2022). Revelations on Grammar Teaching Based on an Analysis of the Syntactic Structure of Transformational Generative Grammar and Metafunctions of Systemic Functional Grammar. *International Journal of Linguistics, Literature and Translation (IJLLT)*, 72–87. https://doi.org/10.32996/ijllt