A GENERATIVE ANALYSIS OF DO-SUPPORT IN QUESTION FORMATION IN THE ENGLISH INTERLANGUAGE GRAMMAR

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ABSTRACT

Generative Second Language Acquisition (GenSLA) is an approach to studying second language acquisition based on the works of Chomsky (1957; 1981; 1995; 2008), in which its potential application in language education has not been widely recognized. In the present study, we use traditional and analytical methods to describe and analyze the application of Do-support in question formation in the English interlanguage grammar (ILG) within the framework of GenSLA. We selected 20 beginner learner informants to judge the grammaticality/acceptability of 16 stimuli. The results suggest that the ILG of the learner-informants is characterized by the following grammatical features in relation to the operation Do-support: (i) the application of Do-support is not obligatory in the interlanguage grammar, (ii) when Do-support applies, the dummy Do and the main verb must agree in tense, and (iii) the generative analysis has shown that these grammatical properties can be accounted for by the under specification and the non-projection of functional categories, CP (Complementizer Phrase) and AuxP (Auxiliary Phrase), respectively. These results agree with the theory of Modulated Structure Building of Hawkins (2001), which states that functional categories are not directly transferred from L1 but instead are acquired and gradually integrated into the grammatical system, which is interlanguage grammar (ILG).

Keywords: *GenSLA, Do-support, grammaticality/acceptability, functional head, modulated structure building*

INTRODUCTION

Generative Second Language Acquisition (GenSLA) is an approach to studying second language acquisition (henceforth SLA) and learning based on the ideas of Noam Chomsky. The basic tenet of GenSLA is that the structure of interlanguage grammar, which can be understood as a continuum from the learners' L1 to their Target Language (TL) (Larsen-Freeman, 1991; White, 2003), is governed by the principles of Universal Grammar. The Universal Grammar (UG) theory posits that humans are equipped with an innate biological endowment for language (Slabakova, 2016). It was formulated to account for the phenomenon known as the underdetermination of syntactic knowledge (Hawkins, 2001) or Poverty of Stimulus (Adger, 2003). This is the apparent discrepancy between language input and the complexity of the language attained, a phenomenon also observed in the second language acquisition process (i.e., ILG), which has been observed to exhibit structures and rules that cannot be learned based on the linguistic input alone (Hawkins, 2001; Schwartz & Sprouse, 2017; Slabakova et al., 2020). The use of a UG-based approach in SLA has not gained much recognition in the field because of the popularity of communicative language teaching or CLT. Moreover, UG, being a biological object (being part of the brain), is said to reach a maturational stage in which it becomes inaccessible (Berwick & Chomsky, 2016), a standpoint anchored on Lennerberg's (1967) critical period hypothesis. Despite this, Slabakova (2016) and Slabakova et al. (2020) argue that the application of GenSLA in language education and research may prove invaluable to language teachers as it has shown to identify the distinctions in linguistic constructions observed in the development of second language grammar. This may enable language teachers to improve teaching strategies and curriculum content design interventions and materials appropriate to the student's level.

Acquisition of Do-support

Forming English questions is one of the most studied structures in generative grammar. Its formation has become one of the bases for theoretical devices such as transformation and deep structure. In its current conception, generative analysis of English questions involves two basic syntactic operations: the wh-movement for wh-questions and head movement (popularly known as Subject-Auxiliary Inversion) for both wh-questions and Yes/No questions. Additionally, an alternative operation known as Do-support, which inserts the dummy Do, applies in cases where head movement is unavailable (i.e., no auxiliary or modal

can be inverted). Acquisition of these grammatical operations has been extensively studied in the first language. Sugisaki (2016), for example, discovered that grammatical operation involved in English question formation follows general syntactic principles. Similar studies on English question formation can be found in the literature on SLA. For instance, Larsen-Freeman (1991) studied the acquisition order of English Question Formation and concluded that the acquisition of this structure follows the order of rising intonation, Un-inverted wh or Aux, Overgeneralization, and Differentiation, which is the target system or rule. Lightbown and Spada (1993) expanded this work by proposing six stages of L2 development of English Questions. They put forward these stages: rising intonation on words, rising intonation on clauses, Wh-movement without auxiliary, copula, or Do-support, copula movement, auxiliary movement and Do-support, absence of copula and auxiliary movement in the embedded clause. White (2003) and Hawkins (2001) offer an explanation for the late acquisition of auxiliary movement and Do-support in these models. Hawkins (2001) attributes the unavailability of auxiliary movement and Do-support to the structure of certain functional categories, while White (2003), in discussing the evidence needed for the acquisition of T to C movement, suggests that SLLs analyze Do as a content word similar to other auxiliaries and modals. She attributed the unavailability of T-to-C movement to T not dominating Do and other auxiliaries. The application of Do-support in question formation is its most salient use. As suggested by the studies conducted within generative grammar in the first and second languages, it is also the most complex and often latest to be acquired as it involves inserting and moving a semantically null element. Moreover, as White (2003) hypothesized, this null element is lexically ambiguous because it is like the action verb Do. Do-support in English also has no structural or transformational analog in most languages, including Tagalog. These reasons could explain the difficulty in acquiring or learning this syntactic operation as observed inside the classroom.

The purpose of the present study is to describe and analyze Do-support in question formation in the English interlanguage grammar of Grade 11 Humanities and Social Science (HUMSS) students from a school in Candelaria Quezon within the framework of GenSLA. The description and analysis of this operation may form a basis for improving teaching strategies, integrating curriculum content, and designing interventions. This aligns with the advocacy of Slabakova et al. (2020) to combine insights from language education research with a more detailed understanding of the structure and rules that govern the (inter) language that GenSLA can provide.

Review of Related Literature

Current Conception of Generative Grammar

Generative grammar has undergone drastic revisions in the last 30 years since Chomsky conceived the minimalist program in 1995. These revisions include rejecting concepts such as the Deep and Surface structures to minimize syntactic derivation. The phrase structure rule and transformation were also not spared from these revisions as they were replaced by a more economical operation known as Merge. In the minimalist program, Merge is the basic syntactic operation that accounts for human language's combinatorial and transformational properties. Merge can simply be defined as an operation that combines two elements in an unordered set, as shown in (1).

(1)
a. Merge (A, B) = {A, B}

b.

$$\begin{array}{ccc} & A & \\ A & & B \end{array}$$
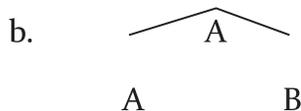
The syntactic objects A and B are selected as the input for Merge in (1a). The output of Merge is an unordered set {A, B}. (1b) shows the tree diagram of this operation. Merge operations reduce the Phrase Structure Grammar and the X-bar theory into a single operation. In addition, transformation or movement is also reduced to Merge. The Merge operation that accounts for movement, unlike Merge in (1), combines two syntactic objects where one is part of the other, as shown in (2).

(2)
a. Merge (A, B) = {A, B} where a copy of A is a member of B

Merge conceptualized in (1) is known as External Merge, while Merge in (2) is known as Internal Merge. Internal Merge captures movement operations such as subject-auxiliary movement, passivization, wh-movement, and topicalization. Additional types of Merge operations have been conceptualized since Merge has been proposed. One type of merge hypothesized by Chomsky (2004) is pair merge, which combines two elements to form an ordered set with the properties of one of the elements unchanged. Pair merge accounts for phrasal adjunctions such as adverbial and adjectival constructions and head-to-head incorporation.

Aside from the combinatorial operations merge, another operation formulated in the minimalist approach that establishes a relation between words and phrases is the operation of Agree. This is an operation that checks features[1] between two syntactic objects in a c-command relation. The operation Agree captures relations among syntactic features. Agree is formulated below:

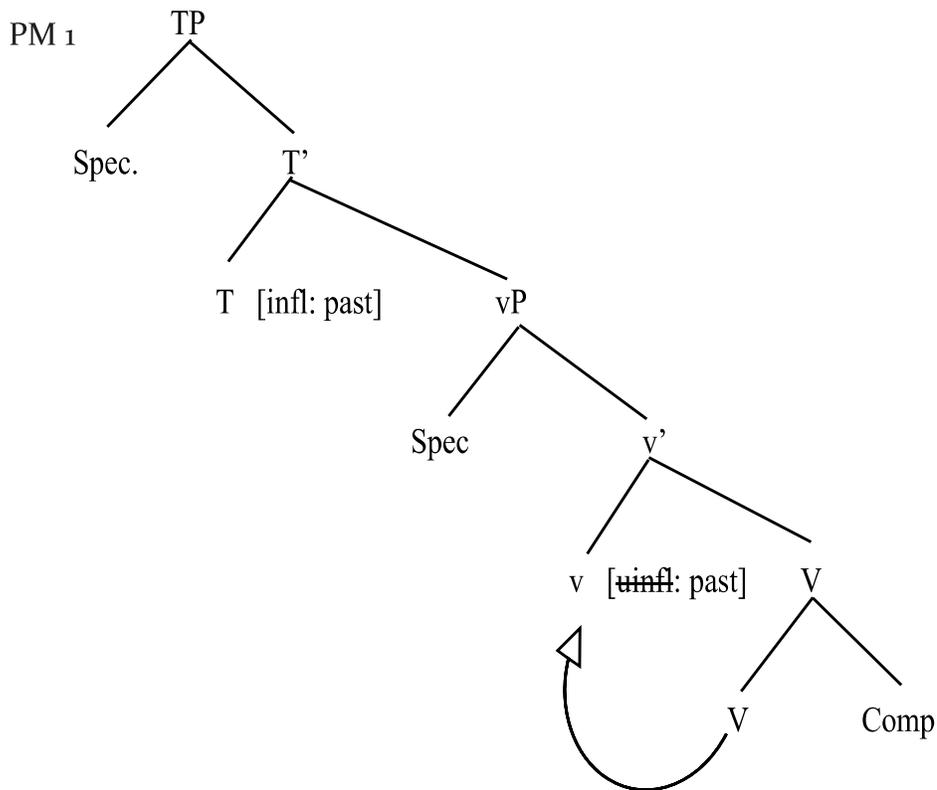(3) Formulation of Agree (Adger, 2003, p. 169)

In the configuration
$$X [F: val] ... Y [\underline{u}F:]$$

Where ... represents the c-command, then F checks and values uF, resulting in
$$X [F: val] ... Y [\underline{uF}:]$$

To illustrate this operation, take, for example, how the tense marking on a verb is derived in the phrase marker 1 (henceforth PM).

PM 1

In PM 1, the T contains an interpretable tense feature, [infl: past], and the small v contains the uninterpretable feature, [*uninfl*: past]. In the minimalist approach of Adger (2003), uninterpretable features need to be deleted through checking/valuing before the derivation is spelled out to the Conceptual-Intensional and Sensorimotor Interfaces where rules apply to compute the sentence meaning and externalization. This necessity is known as the principle of Full Interpretation. Uninterpretable features can only be checked under syntactic relations such as sisterhood and c-command. Sisterhood is defined in (4), while c-command, an extension of sisterhood, is given in (5).

(4) Sisterhood

X and Y are sisters if X and Y are dominated by node Z and X and Y do not dominate each other.

(5) C-command

X c-commands Y if Y is a sister to X or Y is dominated by Z, which is a sister to X.

Obviously, sisterhood and c-command can be established locally by Merge, External and Internal. However, the latter condition of c-command is a long-distance relation that may not be established by the operations Merge. In PM 1, T and v cannot establish a relation through sisterhood since T and v are neither external nor internal merged together. Nevertheless, v can still have its uninterpretable feature checked/valued via c-command relation with T. This long-distance checking of feature is what the operation Agree is for.

The minimalist program is a version of generative grammar that minimizes the number of operations attributable to innate knowledge, thus making the theory of Universal Grammar more elegant and simpler.

Generative Study of Interlanguage Grammar: L1 and UG at work

One of the lines of inquiry that arose from GenSLA is how much influence L1 can have on the structure of the ILG. Answering this question allows researchers to determine the role of UG in shaping the ILG. Structures and principles that the ILG possesses may be attributable to L1. Thus, such objects of analysis may be explained through the principle of transfer. If such grammatical properties cannot be explained using this principle, they may be attributed to UG. White (2003), Hawkins (2001), and Schwartz and Sprouse (2017) are among those who examined the

possible role of UG by investigating rules and structures of the ILG that were derivable from neither L1 nor L2 input.

Unlike a child acquiring their first language, a second language learner (SLL) has an existing grammar when they start acquiring their second language. This existing grammar may influence the principles and structures of their ILG. It has even been hypothesized that L1 is the initial state of the ILG. If this is indeed the case, principles and structures of L1 should be observed in the early stages of ILG. This hypothesis, known as Full Transfer (henceforth FT), is supported by studies such as those conducted by Haznedar (1997), Yuan (1998), and Slabakova (2000).

Haznedar (1998) conducted a case study of a four-year-old Turkish child learning English named Erdem. It investigated the word order of the ILG in its early stages, which analyzed the spontaneous production of the subject. The study found that the Turkish word order, which is the verb-final, is observed in the child's ILG. For instance, the transfer of Turkish word order allowed an English construction *I something eat*. The study lends support to the theory that the early stage of ILG is like the grammar of L1. Another study that supports the FT hypothesis comes from Yuan (1998), who was interested in the acquisition of Chinese reflexive *Ziji* by English-speaking and Japanese-speaking learners. *Ziji* is a Chinese reflexive pronoun that allows long-distance reference; that is, it violates Condition A of the Binding theory. It was found that in an acceptability judgment task, Japanese-speaking learners are more likely to recognize the long-distance reference of *Ziji* than their English-speaking counterparts. This can be explained by the learners' L1s in which, just like Chinese, Japanese has pronouns that allow long-distance reference, unlike English. Yuan's data suggest that L1 is the ILG's initial state, which further supports the FT hypothesis.

Another study supporting the FT hypothesis is the investigation of Slabakova (2000), who examined the acquisition of telicity, indicating that a clause or sentence has a natural endpoint. Different languages have different ways of expressing telicity. For instance, English and Spanish do not morphologically mark the verbs for telicity but instead express telicity in the cardinality of the direct object, contrast *made a cake* and *made cakes*. However, this is not the case in Bulgarian, where telicity is directly marked on the verbs. This difference between English and Spanish and Bulgarian served as a basis to test whether such difference would make Bulgarian-speaking learners of English have difficulties in identifying telicity in English since it is marked differently in their L1. It was found that Bulgarian-speaking learners of English were not consistent in their judgment of telic sentences.

The preceding literature supported the FT hypothesis and established the role that L1 played in the development of the ILG. It appears that L1 is the state zero of the ILG. However, there are instances that cannot be explained by the interaction of L1 grammar and L2 grammar. Such instances, if not accounted for by the input, provide evidence to the hypothesis that UG is still operative in the SLA. This hypothesis is known as the Full/Partial Access (henceforth FA) hypothesis.

The study of Zobl (1980, as cited in Hawkins, 2001) investigated the acquisition of English word order by French speakers. It showed that French speakers effortlessly acquired the Subject-Verb-Object (SVO) word order of the English language, even with pronominal objects. This is even though French word order does not conform to such structure. The French language has what linguists call a clitic climbing operation. Another compelling evidence that the structure of ILG cannot be predicted from the structure of L1 and even L2 input comes from the case study cited by Schwartz and Sprouse (2017). This is the case of a Turkish student named Cevdet, who is learning German as a second language. German language has a property linguists call Verb Second or V2 rule.

In summary, the literature in GenSLA supports the hypothesis that L1 influences the principles and structures of the ILG. However, there are data that this hypothesis fails to explain, such as those found in Hawkins (2001) and Schwartz and Sprouse (2017). Such data can only be fully explained using the theory of Universal Grammar, which is made up of Merge and other grammatical operations. Thus, SLLs do not only have access to the L1 grammar but to Universal Grammar as well. This hypothesis that SLLs resort to their L1 and UG in constructing the principles and structure of the ILG is known as the Full Transfer and Full Access Hypothesis.

Theoretical Framework

This study adopts Hawkins's theory of modified structure building (2001). This theory was based on the Full Transfer and Full Access hypothesis proposed by Schwartz and Sprouse, who claim that "L1 constitutes the initial state of the ILG" (White, 2003, p. 61). This initial state, however, develops into a new set of grammars when L2 structures and principles cannot be acquired via transfer. When this happens, the SLLs resort to their innate mental grammar or UG to acquire L2 structures and principles. In addition, the changes that occur in the development of the ILG are guided or constrained by UG principles. Figure 1 shows how the development of interlanguage grammar proceeds according to the Full Transfer and Full Access hypothesis. According to this model, when the SLLs receive L2 input indicated in the figure as Primary Linguistic Data (PLD), they analyze the

input with L1 grammar, the initial state of their mental or interlanguage grammar (ILG). This is indicated in the figure with the S_o=L1. This state explains why most errors in the early stage of SLA are L1-like. This also explains why some L2 structures and rules are easily learned when similar to those in L1. As the acquisition proceeds, the consequent ILGs develop new rules and structures that can be considered errors in relation to the grammar of L2. These rules and errors may still be L1-like, but it may also be possible that they do not conform to the grammar of both L1 and L2 systems (Schwartz & Sprouse, 2017). This particular stage of the second language acquisition process is represented with ILG_n. Finally, the ILG reaches the final stage of the process symbolized by the ILGs or the final stage. At this stage, the rules and structures of the ILG and L2 are the same, but some differences may still be observed (White, 2003).

In the theory of Modulated Structure Building, lexical categories such as NP, VP, AP, and PP are directly transferred from L1, constituting the initial stage of the ILG. As the SLA progresses, functional categories such as CP, vp, TP, AgreeP, AspectP, and their features are gradually added to the ILG reducing the SLLs' task into the acquisition of functional categories and their features. The distinction between lexical and functional categories as the focal point of the acquisition process is not a new idea in generative grammar. For instance, Lebeaux (2000) analyzed telegraphic speech as the stage of grammatical development. He concluded that grammatical/function words and bound morphemes are not yet integrated into the grammar of children, constraining their ability to build complex phrase structures in their grammar. In the context of GenSLA, the Minimal Tree hypothesis of Vainikka and Young-Scholten (1994) and the Valueless features hypothesis of Eubank (1996) both adopt this conclusion to explain several second language acquisition phenomena, including the acquisition of German word order. In the study of language variation, functional categories are claimed to be the locus of differences among languages, as claimed in the Borer-Chomsky conjecture. The present study attempts to explain the rules/structure constraining the application of *Do*-support based on the availability of functional categories and their features as theorized by the Modulated Structure Building of Hawkins (2001).

Figure 1
Development of ILG according to GenSLA (White, 2003).

Research Paradigm
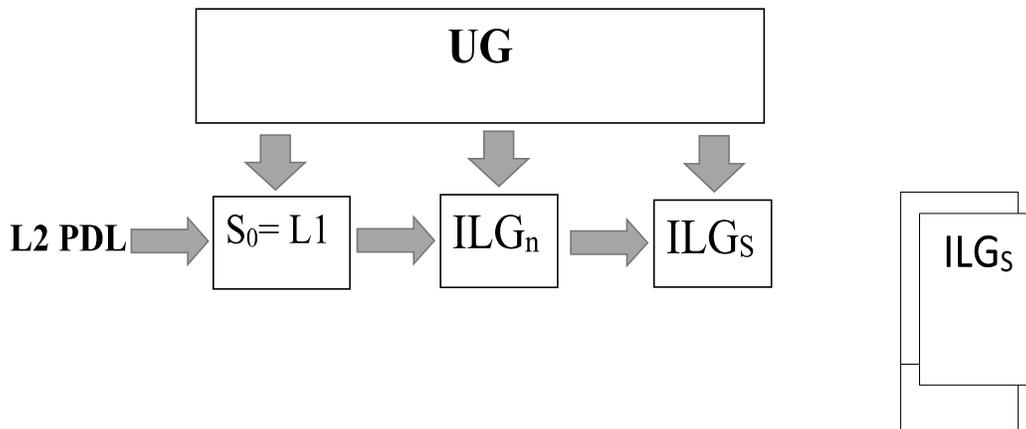
Note: L2- Second Language, PDL- Primary Linguistic Data, S_0- Initial state, ILG-Interlanguage Grammar.

Research Gap

The theoretical orientation of GenSLA and the practical nature of language teaching have naturally separated the two disciplines from mutual connection; GenSLA researchers conduct studies without pedagogical concerns, while language teaching draws insight from non-generative approaches to language learning and acquisition. Slabakova et al. (2020) have advocated for the integration of GenSLA in informing the teaching and learning of a second language as it encourages not only collaboration with other theoretical approaches to SLA but also opens new avenues for research and practical applications to gain insights about the second language acquisition process to improve teaching strategies, and curriculum content, and to design intervention, and materials appropriate to the students' level. The present study is a step toward this goal by bridging the gap between GenSLA and language pedagogy in the Philippine classroom setting. The description and analysis of the students' knowledge of syntactic operation *Do*-support, as represented by their ILG in the form of judgment responses provide essential information in designing instructional materials to align the structure of the ILG with the target language.

Research Questions

This study aims to describe and analyze the operation *Do*-support

in English question formation in the interlanguage grammar of Grade 11 HUMSS students from Candelaria Quezon. It aims to answer the following questions:

1. What characterizes the learners' syntactic knowledge of *Do*-support in question formation in terms of:

        1.1. application of *Do*-support in question formation; and

        1.2. tense form of the dummy *Do* in finite sentences?

2. How does generative grammar account for the learners' syntactic knowledge of *Do*-support in question formation?

Scope and Limitation

The present study was conducted in a school in Candelaria Quezon and spanned from May 2023 to October 2023. The judgment task, the data collection technique used in the study, was participated by 20 beginner learner-informants (Grade 11 HUMSS students) from the said school. It aimed at operationalizing the learner-informants' syntactic knowledge of *Do*-support and the tense form of the dummy *Do*. It is by no means intended to measure how the participants process and comprehend questions with *Do*-support (computational vs. algorithmic approach (Sprouse & Almeida, 2018)). Additionally, the syntactic rules/structures relevant to the study were only the *Do*-support and the tense form of the dummy *Do*; it excluded other syntactic rules/structures that may have influenced the grammaticality/acceptability of the stimuli. Similarly, gender, grade, level, strand, and L1 were also excluded from the analysis as the study did not examine the influence of these variables on the grammaticality/acceptability of the stimuli. Lastly, due to the non-probability sampling methods employed and the small sample size, the study results are not generalizable to most second-language learners.

Significance

Studies in GenSLA are conducted to analyze the structures of ILG and reveal the computational principles governing such structures. This allows linguists and interlanguage researchers to develop models of the SLA that may help teachers and curriculum committees in schools, school districts, and divisions to design lessons and curriculum contents that specifically address grammatical structures and rules that may present problems to the students. Additionally, as the study is linguistic by nature, its result benefits linguistic researchers, especially interlanguage researchers, as it offers further support or contradiction to the current theoretical trends in mainstream linguistics and language acquisition.

RESEARCH METHODOLOGY

Design

This study adopts a mixed-method design. It used both traditional and analytic methods to describe and analyze *Do*-support and the tense form of the dummy *Do*. The traditional method in empirical syntax is an informal approach to gathering judgment from the speakers of the language. This is contrary to the experimental syntax that Cowart (1997) advocated, which is characterized by the formal application of experimental design in grammaticality/acceptability judgment tasks. The traditional method differs mainly from experimental syntax in the use of binary responses instead of scale (Sprouse & Almeida, 2018). The traditional method, however, has several advantages over the experimental one, such as deploying the traditional method is cheap, and the traditional method has increased statistical power (Schutze & Sprouse, 2013; Sprouse & Almeida, 2018). After gathering the judgment responses from the learner-informants, we used the analytic method, which can be defined as "concerned with investigating the (phenomenon) domain in question. It deploys and tests concepts and architecture developed in theoretical work, allowing for understanding the domain and sharpening the concepts" (Chametzky, 1996, p. xviii). This approach in syntactic study allows the researcher to test proposed syntactic derivations and structures and modify them accordingly based on the given data.

Participants

Grade 11 HUMSS students (*N*=20) were selected to serve as learner-informants (henceforth LI) in the grammaticality/acceptability judgment task because of their availability to researchers. The learner informants were enrolled in the school where the study was conducted and were also taught English language subjects by one of the researchers. The number of learner informants is based on the study of Sprouse and Almeida (2013) on the statistical power of various forms of judgment tasks. According to their study, the Forced-choice task is the most statistically powerful task, only requiring 15 informants to achieve 80% statistical power[2] (Schutze & Sprouse, 2013). Relevant information about the learner-informants is given in Table.

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2   Spinner and Gass (2019) caution against the extension of this result to judgment tasks used in second language research.

Table 1
Relevant information about the Learner-Informants (LI)

Demographic Profile	n	%
Gender		
Male	4	20
Female	16	80
First Language		
Tagalog	19	95
Maranao	1	5
Average Grade in English (Grade 10)		
79	2	10
80-84	7	35
85-89	5	25
90-94	6	30

Note: Most LIs (Learner-Informants) are female (*N*=16). While this may affect the external validity of the result, we did not consider gender as a relevant variable in the study. It can also be observed that the L1s (first language) of most learner informants are Tagalog (N=19), whereas one student has a different L1, Maranao.

The use of non-probability sampling methods and a small number of learner-informants render the sample nonrepresentative; thus, the results of the present study are not generalizable to the majority of second language learners.

Instrument

The instrument used to gather the relevant data in this study is the grammaticality/acceptability judgment task. According to Schutze and Sprouse (2013), judgment data provides information about the grammaticality or acceptability of sentences that rarely occur in a conversation or written form, which is the subject of corpus study. There are two major types of grammaticality/acceptability judgment tasks: the informal and formal types. Informal or traditional judgment tasks include Forced Choice (FC) and Yes/No, while formal judgment tasks include Likert Scale, Magnitude Estimation, and Gradience. The present study made use

of the Forced Choice (FC) task. Forced Choice (FC) is a type of judgment task in which only two options are presented. The study participants must choose which of the two sentences is grammatical/acceptable. Like other judgment tasks, FC has its advantages and disadvantages. The two advantages of FC over other judgment tasks are that it is easier to deploy and has increased statistical power (Schutze & Sprouse, 2013; Sprouse & Almeida, 2018). However, FC only gives information about the size difference between two sentences in the form of proportion. Moreover, it does not provide information regarding the acceptability status of a sentence on an overall scale (Schutze & Sprouse, 2013). In this study, we designed an instrument that consisted of a total number of 32 pairs of sentences: 16 pairs of sentences relevant to the study, eight items for Do-support and another eight items for tense form of Do, and the other 16 serving as fillers. The instructions in the instrument were translated into Tagalog for better comprehension among the learner-informants. The final draft of the instrument was checked and validated by the School Research Committee[3] where the research was conducted.

Data Gathering Procedure

After the instrument was checked and validated by the technical and content validators of the School Research Committee, we sought permission from the School Head to allow us to conduct the experiment with the selected students from HUMSS 11. After we secured the permission, we piloted the instrument with randomly selected HUMSS 11 students from the same section. These students were excluded from the selected students who would participate in the actual judgment task. The pilot testing informed us that the students judged the stimuli based on the preceding pairs. The pilot participants also raised concerns about the length of time (20 sec. per pair) in which they judged the stimuli. Consequently, the order of the stimuli was randomized, and the length was extended to 30 seconds. After these changes were made, we conducted the data collection procedure on September 27, 2023, in one classroom. The learner-informants were first given a consent letter to fill out. The consent letter informed the learner-informants about the purpose of the study, the benefits and risks of volunteering for the study, and the provisions of the Data Privacy Act. The instructions for the grammaticality/acceptability judgment task were then explained to the learner-informants in Tagalog. They were then asked if they had any questions regarding the task. After

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3   The research committee that checked and validated the instrument had two language teachers as committee members.

ensuring that there was no question that learner-informants wanted to ask, we started to show each stimulus to the learner-informants in 30 seconds to which they provided their judgment response by shading the circles in their answer sheets. The learner-informants judged a total number of 36 stimuli. When the learner-informants finished the task, we collected their answer sheets to tally and analyze the responses.

Data Analysis

To determine if there is a statistically significant difference in the number of grammatical/acceptable judgment responses between two grammatical structures, i.e., Target Language application of *Do*-support versus absence/overgeneralization of *Do*-support, and the dummy *Do* is only marked for tense vs both the dummy *Do* and the main verb are marked for tense (double tense). We use the binomial test for N> 35, a test commonly used to determine if the observed frequency is significantly different from the expected frequency by chance. In terms of binary judgment tasks used in the present study, the binomial test determines if the number of grammatical/acceptable judgment responses significantly differs from the number expected by chance.

RESULTS AND DISCUSSION

3.1 Application of *Do*-support in the Interlanguage Grammar

The judgment responses of the learner-informants were separately analyzed according to the relevant grammatical structures. Table 2 shows the results in which the correct application of *Do*-support is the relevant domain, while Table 3 shows the z-score and its corresponding probability.

Table 2
Frequency of Judgment Responses

	Grammatical/Acceptable Judgement Responses
TL Application of *Do*-Support	85
Non-TL Application of *Do*-support	75

Note: Total number of judgment responses is 160 (N=160). TL: Target Language

Table 2 shows that the number of grammatical/acceptable judgment responses to TL Application of *Do*-Support is greater than the number of

grammatical/acceptable judgment responses to Non-TL Application of *Do*-support, 85>75. The binomial test, however, shows that this result is not statistically significant.

Table 3
z-score and its Corresponding Probability

z-score	Cumulative Probability (One-tailed)	Cumulative Probability (Two-tailed)
0.71	0.7611	0.4777

Note: z-score= 1.96; p= 0.0512, α.05 (two-tailed)

The computed z score in Table 3 is 0.71, p=.47, while the critical z score is 1.96, p=.05. The observed z score is less than the critical value, 0.71<1.96. This means that the null hypothesis is accepted, and there is no statistically significant difference in the number of grammatical/acceptable judgment responses for the TL Application of Do-Support and the Non-TL Application of *Do*-support. This indicates that the LIs are inconsistent with their judgment of the stimuli that do not show TL Application of *Do*-Support. This suggests that the application of *Do*-support is inconsistent or non-obligatory.

Tense Form of *Do*

For the tense form of *Do*, Table 4 shows the number of grammatical/acceptable judgment responses of learner informants to the eight stimuli while Table 5 shows the z-score and its corresponding probability.

Table 4
Frequency of Judgment Responses

	Grammatical/Acceptable Judgement Responses
Only the dummy *Do* is marked for tense.	67
Both the dummy *Do* and the main verb are marked for tense. (Double tense)	93

Note: Total number of judgment responses is (*N*=160).

Table 5
z-score and its Corresponding Probability

z-score	Cumulative Probability (One-tailed)	Cumulative Probability (Two-tailed)
-1.97	0.0244	0.0488

Note: z-score= 1.96, p= 0.0512, α.05 (two-tailed)

To test whether this result has a statistically significant difference, we computed the z score for the data in Table 4.

The result of the binomial test shows that z=-1.97, p=.048. The observed z score is greater than the critical z score of 1.96, p=.05; thus, H_0 is rejected. This indicates that the number of grammatical/acceptable judgment responses when only the dummy *Do* is marked for tense is statistically significant from the number of grammatical/acceptable judgment responses when both the dummy *Do* and the main verb are marked for tense. Specifically, the number of grammatical/acceptable judgment responses for the former is significantly less than the number of grammatical/acceptable judgment responses for the latter. This indicates that in the ILG of the LIs, questions with double tense on the dummy *Do* and the main verb are considered grammatical/acceptable, which is the opposite case in the Target Language, English.

3.2 Generative Analysis

Based on the results of the judgment task, we derive the following characteristics of the *Do*-support operation in ILG of the LIs.
(11)
The application of *Do*-support is not obligatory.

(12)
When *Do*-support applies, the dummy *Do* and the main verb must agree in tense.

3.2.1 Non-obligatoriness of *Do*-support

The non-obligatoriness of the dummy *Do* typically in *wh*-questions may be due to the under specification of the Complementizer Phrase (CP), as explained by Hawkins (2001). In the generative analysis of question formation, as Adger (2003) discussed, the CP plays a vital role in forming English questions as it hosts both the auxiliary and the *wh*-word. CP has

the following structure.

PM 2

CP

Spec   C' [*u*wh]

Wh-word   C

[Q]
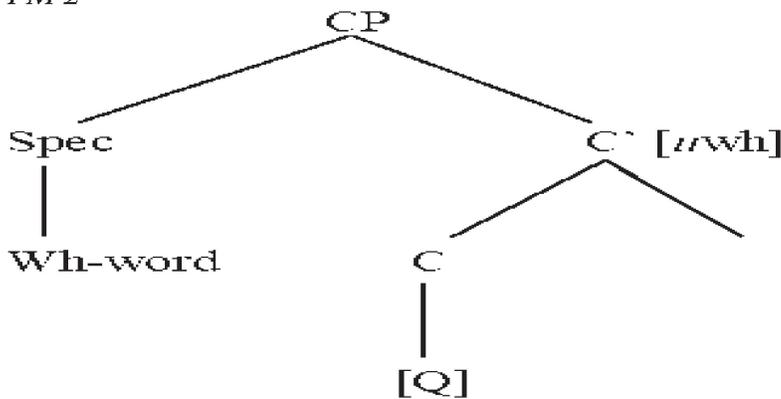
In this structure, the CP is shown to possess two features: the interpretable Q feature and the uninterpretable *wh*-feature. Both features need to form relations with other elements to meet the Principle of Full Interpretation. That is, Q needs to check/value an uninterpretable feature, and *wh*-feature needs to be checked/valued by an interpretable feature. This subsequent checking/valuation can be accomplished through the operations Agree or Merge (External or Internal). The choice between these operations is based on the strength of the uninterpretable features involved in the operation. In English, the [u*wh*] and [clause-type] of T are strong, so they need to be checked/valued through sisterhood. The clause-type feature is checked/valued by moving and pair merging T to C.

PM 3

CP

Spec   C' [*u*wh]

C

T [u~~clause-type~~: Q]   [Q]
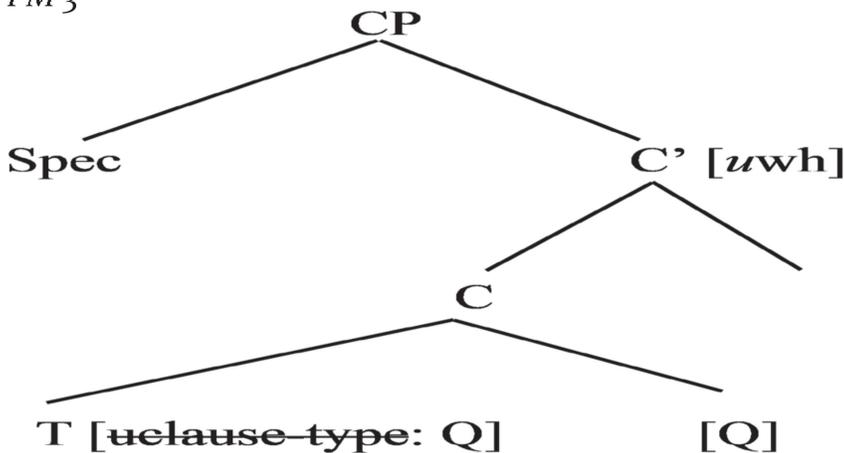
This subsequent movement and pair merge of T to C accounts for the subject-auxiliary inversion as T is moved next to the position of Q along with whatever pied-piped element is attached to T. The *wh*-feature, on the

other hand, is checked/valued by moving (internal merge) the wh-word to the Specifier of C.

PM 4
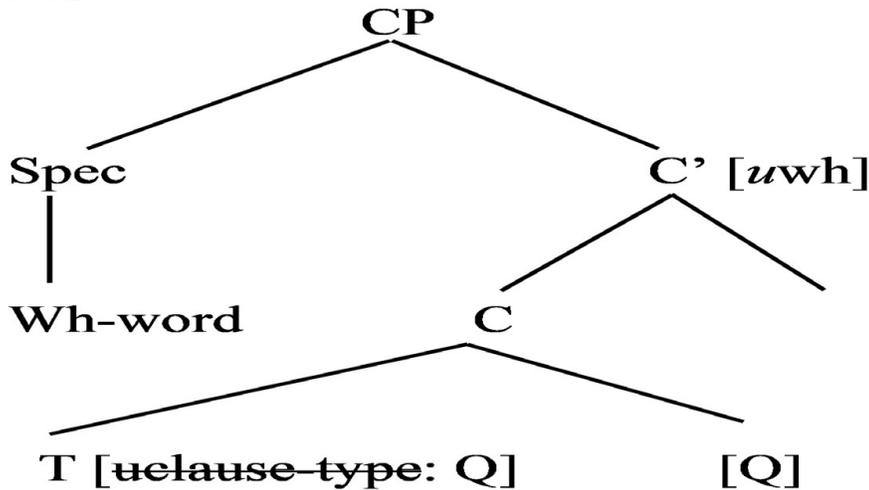
With this mechanism of question formation using the CP structure outlined, we hypothesize that the absence of the dummy *Do* typically in *wh*-questions can be explained by the non-TL representation of CP in the ILG under CP specification. We argue that the [clause-type] feature of T is weak and can be checked by the operation which does not necessitate the movement and pair merge of T to C. We agree that it does not necessitate the movement and pair merge of T to C. This proposal, however, cannot be extended to the Yes/No questions as they exhibit *Do*-support. This may be explained by Hawkins' (2001) assumption that questions only need one overt element or morpheme in their initial position:

> And it may be that there is some kind of principle economy of representation operating in development that requires that features like Q be marked by one evert morpheme. This would require a form to appear under C in yes/no questions, but since the *wh*-phrase appears in the specifier of CP in *wh*-questions, the head C can remain silent (p. 153).

We can formalize Hawkins' (2001) assumption in (13).

(13)
When the Specifier of C is non-empty, the C can remain null.
 The absence of *Do*-support can be derived from this assumption as the *Do*-support may not apply in *wh*-questions because the *wh*-word already

checks/values the uninterpretable feature of C' by occupying the Specifier position of CP.

3.2.2 Double Tense on *Do*

To analyze the double tense on *Do* and the main verb within the framework of generative grammar, we first need to provide a generative analysis of how the verb gets its tense. Adger (2003) argues that the tense of the verb is a manifestation of the agreement between the functional head T and v. This is shown in PM 5 where v possesses an uninterpretable feature infl which stands for inflection. This uninterpretable feature is then checked through the operation Agree, as shown in PM 5.

PM 5
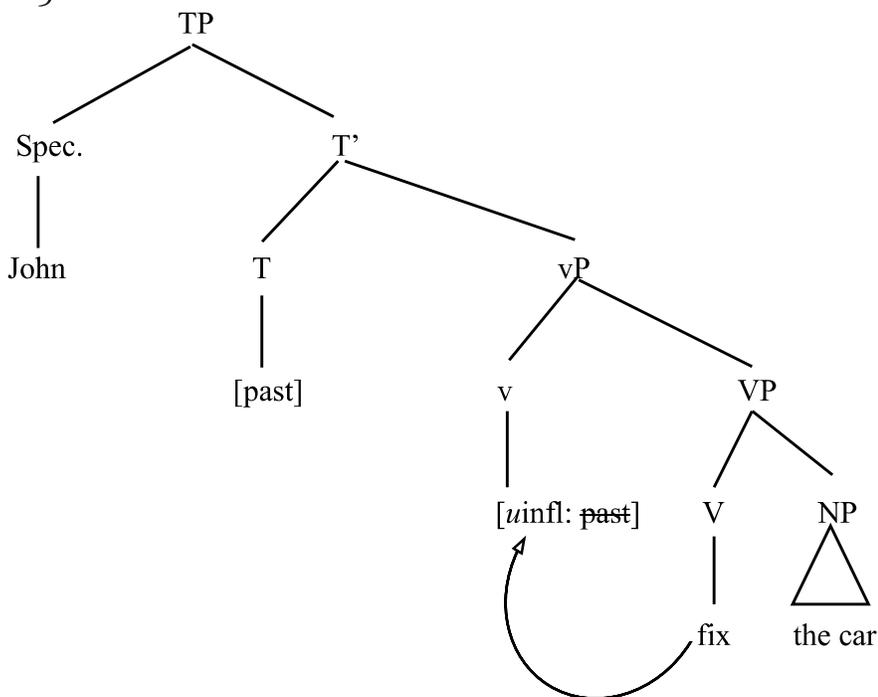
Agree (T [infl: past], v [*u*ninfl: past]) = {T [infl: past], v [u̶n̶i̶n̶f̶l̶: past]}

After this relation is established, V, which holds the main verb, moves to the position v and is consequently interpreted by the sensorimotor interface as a morphologically tense-marked verb. The main verb is marked by -*d* or -*ed* in the example above. This mechanism of deriving the morphological tense marking on verbs is captured by the principle that Adger (2003) put forward, the Pronouncing Tense Rule.

(14) **Pronouncing Tense Rule (PTR)**
   In a chain (T [tense], v [*uninfl*: tense]), pronounce the tense feature on v only if v is the head of T's sister.

   The PTR ensures that the <v, V>, the result of verb movement to small v, bears the morphological tense marking *-d*, *-ed*, or *-s*. However, this analysis of how a verb obtains its tense marking can only account for a sentence with a main verb; it fails to capture sentences with auxiliaries such as modals and dummy *Do*. To this end, Adger (2003) offered an alternative analysis for sentences with auxiliaries and modals. Its analysis provides that auxiliaries such as modals and dummy *Do* occupy the T position. Thus, its interpretable tense feature checks the uninterpretable features of auxiliaries, modals, and dummy *Do*. This analysis captures the blocking effect of auxiliaries on the agreement between T and v, thus violating the PTR, verbs after auxiliaries, modals, and the dummy *Do* do not bear tense marking.

PM 6
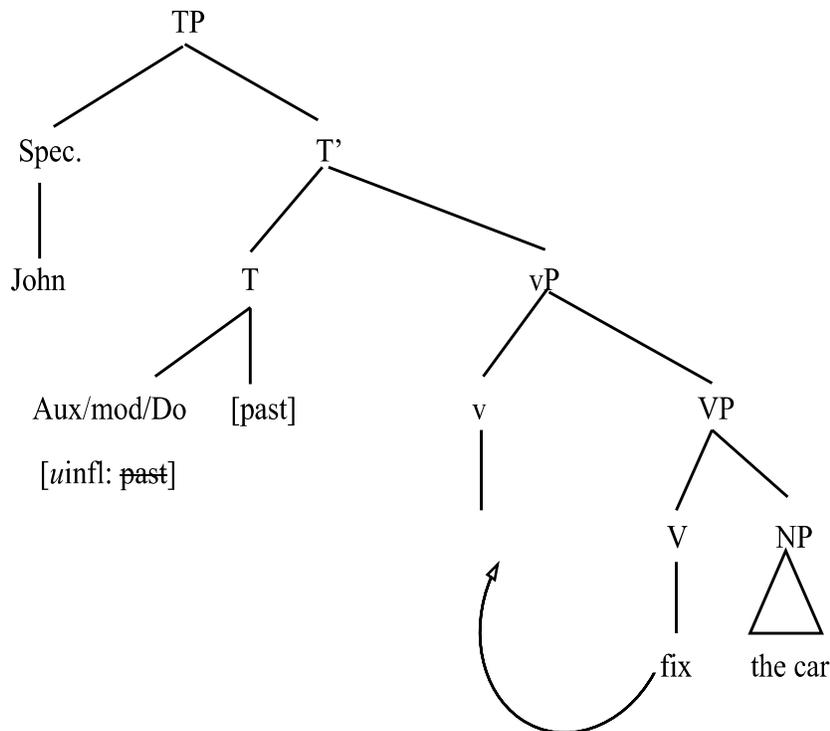
   Nevertheless, this analysis does not prevent the agreement relation between T and v as this relation is not established through external and internal merge similar to the insertion of modals and movement of aspectual verbs. Instead, T agrees with v using a long-distance relation c-command. This point is important as agreement between T and v is not blocked using

a natural constraint. To derive the blocking effect of modals and dummy *Do* from a natural constraint, we adopt the Minimality constraint. Many versions of this constraint have been proposed in the literature. However, we will adopt and modify the version found in Culicover (1997), which states that "If α and β both can check off feature [F], the closer one is the one that can undergo Agree or internal merge" (353).

In the previous analysis of the intervention effect of auxiliary, modal, or dummy *Do*, the minimality constraint cannot apply in the case of these elements because they are directly inserted in the T head. This is problematic since T can still establish a relation with v. Thus, we can expect the main verb to be morphologically marked for tense despite the existence of auxiliary, modal, or the dummy *Do*. This situation, we argue, may be at play in the constructions where *Do* and the main verb are both morphologically marked for tense. But first, to derive the intervention effect, we propose that auxiliary, modal, or dummy *Do* are dominated by a functional head, Aux. This proposal is presented in PM 7.

PM 7
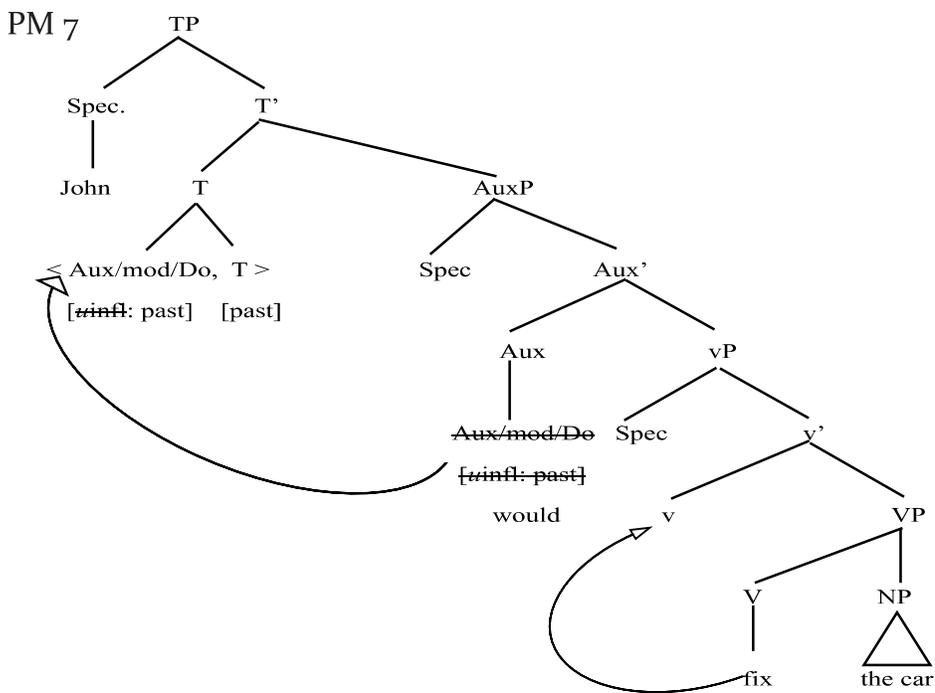
In PM 7, Aux, being the closest object to T, establishes a relation with T via the operation Agree or internal pair merge where T and Aux are merged to create a single element specifically an ordered set <T, Aux> where the ordered set retains T's property (Chomsky, 2000; 2004). The feature of T can no longer be used to check additional uninterpretable features in vP

because of a copy (t) left by Aux when it is an internal pair merged with T.

This analysis naturally derives the intervention effect of auxiliary, modal or the dummy *Do* from minimality constraint. The violation of PTR also follows from the minimality constraint as v is no longer marked for tense since v is no longer the head of T's sister.

To explain the constructions where *Do* and the main verb are both morphologically marked for tense or double tense in the context of the preceding proposal, we assume that the AuxP, the phrasal projection headed by auxiliary or the dummy *Do*, is a functional category, yet to be acquired by the learner-informants. According to Hawkins' (2001) theory of Modulated Structure Building, functional categories need to be acquired by learner-informants because these types of categories are not transferred from L1. If we assume that AuxP is not yet available in the ILG of the learner-informants, it will explain why the T-to-v agreement is not blocked. The dummy *Do* then is not internal merged with T but instead it is external merged. The difference between these two operations lies in how the elements to be merged, in this case, the T head and dummy *Do*, are accessed. In the former type of merge, T and *Do* are already in the previously constructed syntactic object; thus, merge needs not access the Lexical Array[4]. The latter type accesses the Lexical Array to pick out the dummy *Do* and merge it with a syntactic object already existing in the structure being built, namely, the head T. The head T, retaining its interpretable feature, can enter into an agreement relation with v, T [past]... v [uinfl: past] since there is no trace left behind by Aux—Aux being directly taken from the lexical array. The structure that represents these operations that have been discussed is illustrated in PM 8.

PM 8

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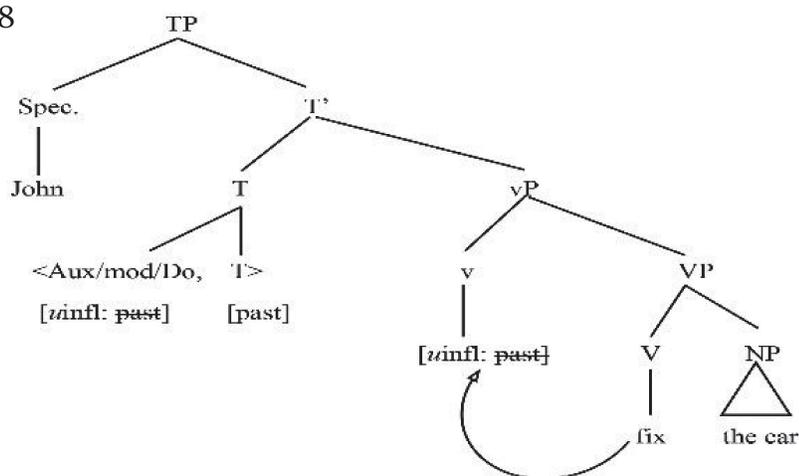
4   Lexical Array (LA) is a set of an unordered set of lexical items (content and function words) that merge can access to assemble syntactic objects.

The respective external merge and the Agree of Aux and v with T shown in (15) result in *Do* and the main verb bearing the inflectional marker *-s*, or *-ed* or *-d*. This gives rise to the double tense phenomenon observed in the ILG.

(15)

a. Merge (T, vP) = {T, vP}

b. Merge (Aux, T) = <Aux, T>

c. Agree (<Aux,T> [infl: past], v [uninfl: past])= {T [infl: past], v [uninfl: past]}

If C is not silent, T along with its pied-piped elements (e.g Aux, modal, or *Do*) is raised and pair merged with C to have its clause-type feature checked/valued. This analysis accounts for the double tense on the dummy *Do* and the main verb.

PM 9
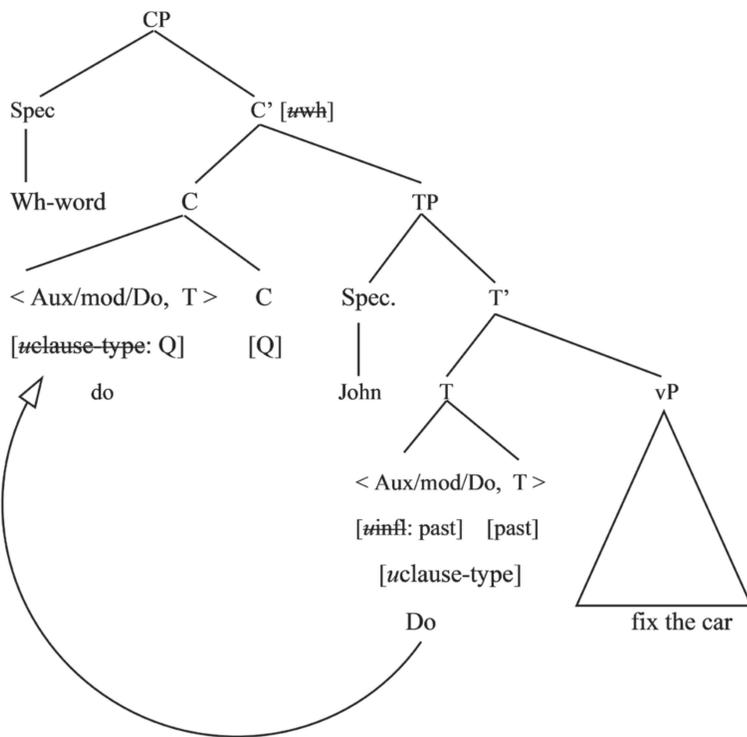
Both the non-obligatoriness of *Do*-support and the Double tense on *Do* and the main verb agree with the basic tenet of GenSLA. The ILG of the LIs exhibit structures and rules that cannot be learned based on the linguistic input alone (Hawkins, 2001; Schwartz and Sprouse, 2017; Slabakova et al., 2020) as these grammatical properties that have been sketched are either unattested or infrequent in the target language. This lends to the plausibility

that the ILG may not conform to the L1 and L2 grammars, *Do*-support has no L1 analog while its application in the ILG is different from the target language. The analysis of the properties of *Do*-support in the L1s' ILG is based on the complete structure and availability of functional categories following the theory of modulated structure building of Hawkins (2001). This theory states that functional categories are not directly transferred to the ILG and need to be learned by the language learners.

CONCLUSION

In this paper, we argue that GenSLA, an approach to the study of a second language within the framework of generative grammar, offers insights into the structure of interlanguage grammar that can eventually inform language pedagogy in terms of improving teaching strategies and curriculum content, and in terms of designing intervention and materials appropriate to the students' level, the current structure of their ILG. This aligns with Slabakova et al.'s (2020) goal and advocacy of integrating GenSLA in language teaching and learning. Furthering this position, we employed GenSLA to describe and analyze the syntactic operation *Do*-support in question formation. Based on the study results, the application of *Do*-support is not obligatory in interlanguage grammar. Additionally, when *Do*-support applies, the dummy *Do* and the main verb must agree in tense. Also, the generative analysis has shown that these grammatical properties (i.e., the non-obligatoriness) of *Do*, and the double tense on *Do* and the main verb, can be accounted for by the under specification and the non-projection of functional categories, CP and AuxP (complementizer and Auxiliary), respectively. This is in line with the theory of Modulated Structure Building of Hawkins (2001), which states that functional categories are not transferred from L1, but instead, they are acquired and specified through language input. From these conclusions, we believe that explicit grammar instructions should be implemented to help learners acquire linguistic structures that do not have an L1 analog, and vocabulary development must include the teaching of function words such as modals, *Do/does*, *Have/has*, and the *Be* verbs.

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Rosemarie M. Bundukin: Investigation, writing, statistical analysis, data curation, validation
Maria Juliean C. Austria: Conceptualization, writing, review, and editing

DECLARATION OF COMPETING INTEREST

No personal or financial conflict of interest has motivated nor arisen from the conduct, analysis, and interpretation of the results of the study.

DECLARATION OF USE OF GENERATIVE AI / AI-ASSISTED TECHNOLOGIES

The use of AI, particularly ChatGPT, in the completion of this study, was limited to inquiries about the issues encountered by the authors during the research process, such as the issue in the sampling and number of participants, the use of the binomial test in judgment task and the issue of generalizability. Responses on these issues from AI were considered—and some were adopted—with great caution and discretion. Additionally, AI was used to generate example paragraphs for the sections in the paper that were unfamiliar to us. The example paragraphs were used as patterns but were not copied verbatim. No section, data, or analysis were directly taken from AI.

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