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**USE OF VERB INFLECTIONS IN THE ORAL EXPRESSION OF AGRAMMATIC
SPANISH-SPEAKING APHASICS**

by

José G. Centeno

**A dissertation submitted to the Graduate Faculty in the Department of Speech and
Hearing Sciences in partial fulfillment of the requirements for the degree of Doctor
of Philosophy, The City University of New York.**

1996

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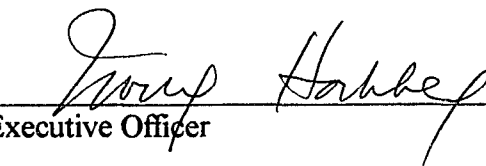
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Abstract**USE OF VERB INFLECTIONS IN THE ORAL EXPRESSION OF AGRAMMATIC
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José G. Centeno

**Advisors: Loraine K. Obler
Helen S. Cairns
Luisa Garro**

Studies on agrammatic verb errors have basically addressed the production of verb forms as whole lexical units without looking at their inflectional affixes. There has been limited research assessing the possible role of the variables encapsulated in verbal inflections in verb access and retrieval. The purpose of this investigation was to, first, address the possible factors causing a hierarchy of sparing in Spanish verb inflections, and, second, extend the explanatory factors proposed by earlier cross-linguistic investigations on verb inflectional performance by agrammatic speakers. This investigation studied the production of verb inflections by agrammatic Spanish speakers in a sentence repetition task.

Twelve native Venezuelan Spanish-speaking subjects, six agrammatics and six controls, participated in this study. The variables predicted to have a critical role in simple and compound verb repetition were: verb form structure, daily usage frequency, theme vowel frequency, paradigmatic frequency, stress, syllabic length, and number. Two separate analyses of the subjects' responses were conducted. The first analysis assessed the number of correct responses per variable feature for all the presented experimental stimuli, namely, simple and compound verb forms. The second analysis, only involving the

variables that were significant in the first analysis and pairing each variable with each other, was only conducted for the correct responses for simple verb forms.

Overall findings showed a hierarchy of importance of variables in verb repetition by agrammatic Spanish-speaking subjects. First, three variables consistently emerged as primary factors in successful verb repetition by the agrammatic subjects in both analyses: syllabic length, number, and daily usage frequency. Second, stress, having a crucial facilitating role in the first analysis, did not show such a strong effect in the second analysis. Third, paradigmatic frequency did not have any impact in the second analysis. Finally, conjugation class did not have a significant effect in the first analysis (and so was not used in the second analysis). These results imply that short, singular, frequently used, and, possibly, unstressed verb inflections are the most likely to be repeated correctly by Spanish-speaking agrammatics.

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1. INTRODUCTION

Agrammatism, a language disorder secondary to acquired brain damage, has been described as a simplification of sentence structure due to “a limited output use of the syntactic and morphological resources of the language” (Menn and Obler, 1990, p.3). In terms of agrammatic verb use, there is evidence illustrating a limited use of verbs relative to nouns in agrammatic speakers (Miceli, Silveri, Villa, and Caramazza, 1984; Kohn, Lorch, and Pearson, 1989; Zingeser and Berndt, 1990) which appears to be associated with semantic or syntactic factors (Kohn et al., 1989; Breedin, Saffran, and Schwartz, 1993; Thompson, Shapiro, Schendel, and Li, 1993). These investigations have mostly addressed the retrieval of verb forms as whole lexical units without looking at their inflectional affixes or the possible role of the variables encapsulated in the inflections.

Indeed, clinical evidence and descriptive reports suggest that the deployment of verb inflections by agrammatic speakers seems to be deficient. For instance, agrammatic English speakers have been observed to rely on simple verb forms, such as the uninflected infinitive and the *-ing* forms (i.e., *go*, *going*), at the expense of complex verb inflectional markings and use of the auxiliary (Goodglass, 1973), and, in languages with a highly inflected verb system, like French and Italian, agrammatic individuals display number, gender, person, and tense errors in their spoken verbs (Jarema and Kehayia, 1992; De Bleser and Luzzatti, 1994).

The general purpose of the following sections is to present the conceptual bases leading to this study of verb inflectional assignment by agrammatic Spanish-speaking individuals. I will start by describing the structure of the Spanish verb system and the

variables associated with its inflections and their use. Then, in light of the lack of reported data on agrammatism in Spanish, I will present evidence in the form of pilot language samples illustrating the verb error profile of agrammatic Spanish speakers. I will continue with a discussion of the issues that have been advanced to explain agrammatic verb errors in speakers of languages of varying verb inflectional complexity, including English, Icelandic, Hindi, Finnish, French, Italian, and Hebrew. Finally, before making the predictions to be investigated in this study, I will introduce a set of variables that have not been addressed in previous investigations of agrammatic verb errors and that might have an impact on the processing and production of verb inflections by agrammatic Spanish speakers. These factors are: agrammatic verb phrase simplification, lexical frequency of occurrence, salience, word morphological structure, and discourse frequency patterns for verb forms.

1.1 The Spanish Verb System

1.1.1 Morphological Features

The Spanish verb system, like that of French and Italian, is highly inflected thus providing an ideal context to further the study of the variables having an impact on inflectional assignment. Spanish verbs encode several semantic notions: tense, mood, aspect, person, and number (Table 1). In addition, each Spanish verb involves a "thematic vowel", *a*, *e*, and *i*, easily recognized in the infinitive (e.g., *tomar*/to drink, *comer*/to eat, *subir*/ to move up, to go up). According to their thematic vowel, Spanish verbs can be classified into first, second, and third conjugation classes depending on whether their inflectional endings follow the *-ar*, *-er*, or *-ir* inflectional patterns, respectively.

Table 1: Grammatical and Semantic Features in the Spanish Verb Paradigm

FEATURE	TYPES
Theme	-ar -er -ir
Tense	Present Past Future
Mood	Indicative Subjunctive Imperative
Aspect	Imperfective Perfective
Person	First Second Third
Number	Singular Plural

Using the morphological descriptions suggested by Stockwell, Bowen, and Martin (1965) and Qüilis and Hernández-Alonso (1990), the structural paradigm of a Spanish verb can be summarized as **STEM + THEMATIC VOWEL + MORPHEME I + MORPHEME II**, in which morpheme I stands for the tense, the mood, and the aspect, and morpheme II represents the person and the number encoded by the particular verb. It is clear that, as suggested by Qüilis and Hernández-Alonso (1990), the morphological structure of the Spanish verb is able to encapsulate the symbolic domain (lexeme [stem]) and the deictic domain (the speaker's conceptualization of the action: morpheme I). In this dissertation, I will employ a conjugation-based approach that will structurally distinguish the verb's stem and its inflectional affix only, as in *comes* (you eat) in which "com" is the stem and "es" is the inflection. This approach differs from a morphologically-based taxonomy that would break a verb down into its theme vowel and its different morphological components, as reported by Jarema (personal communication, April 25, 1996).

Mood: These are meanings communicated by a verb involving the "speaker's attitude to the proposition or to its truth-value" (Dahl, 1985). Gili-Gaya (1989) identifies three moods in Spanish: *indicative*, *subjunctive*, or *imperative*. The indicative mood expresses actions considered real or certain (e.g., *Yo tomo vino*/I drink wine), the subjunctive mood refers to possible, wished, or uncertain actions (e.g., *Dudo que yo tome vino*/I doubt that I would drink wine), and the imperative mood expresses commanded actions (e.g., *¡Toma!*/Drink!).

Tense and Aspect: Three tenses can be communicated by Spanish verbs; *present*, *past*, and *future*, depending on when the action described by the verb occurs. However, the action expressed by the verb can involve temporal shades in meaning unrelated to tense and resulting from the sentential context addressing the action's duration or completion. These temporal specifications are identified as aspectual features. Comrie's (1976) terminology illustrates these fine temporal descriptions by referring to tense as situation-external time and aspect as situation-internal time. To Comrie, aspect is not concerned with relating time of the situation to any other time-point (as tense does), but rather with the internal temporal consistency of the one situation. For instance, consider the aspectual differences in these examples of past-tense sentences; "*When she called, I was having dinner*" and "*When she called, I had dinner*". In the first sentence, the two actions, "*Calling*" and "*Having dinner*" occur within the same time frame, whereas, in the second sentence, "*Calling*" precedes "*Having dinner*". Both sentences denote past tense situations yet differ in their internal temporal dynamics.

Stockwell et al. (1965) describe aspect as *imperfective* or *perfective* depending on whether we conceptualize an event in terms of the course of its occurrence (imperfective) or its termination (perfective). They add that perfective forms in Spanish are necessarily past tense, and imperfective forms can be either past or non-past. The Real Academia Española, REA, (1985) calls perfect tenses the *pretérito perfecto simple* (PR¹: tomé/drank), and all the compound tenses such as *pretérito perfecto compuesto* and *pretérito pluscuamperfecto* (PRP: he tomado/have drunk; PRC: había tomado/had drunk)

¹ Abbreviations (P, PR, PRI, etc.; see Appendix A) are only given for those verb forms that are used in the experimental stimuli of this study.

since the past participle (*tomado*/drunk) gives the auxiliary a perfective meaning (Appendix A). In contrast, excluding the *pretérito perfecto simple*, REA calls imperfect tenses all of the simple tenses: *presente* (P: tomo), *pretérito imperfecto* (PRI: tomaba), *futuro* (tomaré), and *condicional* (C: tomaría) in the indicative mood; and *presente* (tome), *pretérito imperfecto* (tomara/tomase), and *futuro* (tomare) in the subjunctive.

Marcos-Marín (1975) states that the Spanish verb system does not have a different morphological marker to indicate aspect, as do Greek, Russian, and Arabic. The only exception in which the perfective-imperfective aspectual opposition is morphologically distinguished in Spanish, and does not depend on sentential or discourse context, is in the *pretérito perfecto simple* (Yo tomé/I drank) and the *pretérito imperfecto* (Yo tomaba/I used to drink, I was drinking). Otherwise, tense, mood, and aspect meanings in Spanish coalesce at the morphological level (Morpheme I in the above paradigm) thus being identified as tense-mood-aspect (TMA) notions, or, more often, as tense-aspect when referring to the temporal characteristics of a particular verb in a sentence.

Person and Number: Spanish verbs also encode agreement information relating the verb form to the agent of the action and its number (Morpheme II above). In this manner, Spanish verbs can express a *first*, *second*, or *third* person for each *singular* (yo/I, tú/you, él/he, ella/she) or *plural* (nosotros [masculine], nosotras [feminine]/we, ustedes/you, ellos [masculine], ellas [feminine]/they).

1.1.2 Other Pertinent Features

Spanish verbs are also subject to other variables such as the stress-assignment rules of the language and frequency patterns in daily discourse.

Stress: Lexical stress placement in Spanish, which can be graphically shown in the word (PRI: *subía*, Appendix A) or only acoustically detected upon speech production (P: “*tomo*²”, Appendix A), can occur on the last syllable or on any of the preceding syllables of a word. Hence, stress placement along the verb syllabic structure can highlight the stem or its inflection as seen in the verb “*Tomar*” whose stem is *tom-*; “*tomo*” (I drink), “*tomamos*” (We drink/drank), and “*tomaría*” (I would drink) (Appendix A). Harris (1969, 1983) notes that each paradigmatic form (all inflected forms for the different tenses) and nonparadigmatic form (infinitive, gerund, and participle) of Spanish verbs have a characteristic stress pattern involving the penultimate syllable that admits no variation. Except for the infinitives and some forms of the preterite and the future, with the stress on the final syllable, Spanish verbs are *always* stressed on the penultimate syllable. Similarly, Ch. Cairns (H. S. Cairns, personal communication, March 5, 1996) notes that Spanish has a basic trochaic, Strong-Weak syllable pattern.

Frequency Patterns in Discourse: Some verb forms are employed more frequently than others in informal conversation as supported by analyses of oral and written Spanish narratives. For instance, frequency counts of verb form use in Venezuelan newspaper articles and soap operas, two media forms selected for reflecting an average language use, substantiate this observation (Appendix C). Carried out as a preliminary study for this dissertation project, this survey of 50 randomly-selected paragraphs from different newspaper articles and 45 minutes of spoken dialogue from three different popular soap operas revealed the indicative mood as the most frequently employed mood (86.1%)

² The stressed syllable is underlined in those cases in which stress is not shown orthographically.

relative to the imperative (7.8%) and subjunctive (6.1%) moods. Tenses in the indicative mood exhibited the following order of decreasing frequency of use: *presente* (53.5%), *pretérito perfecto simple* (25.5%), *pretérito imperfecto* (4.8%), *pretérito perfecto compuesto* (4.4%), *condicional* (3.2%), and *pretérito pluscuamperfecto* (1.6%). As to the future tense, *futuro*, although it was used more frequently than the *pretérito imperfecto* (6.5%), its periphrastic form, “*ir a*” [to be going + infinitive], was more likely to be employed than its inflected form (81.2% [*Yo voy a comer*/I’m going to eat] vs. 18.8% [*comeré*]). Finally, the *condicional perfecto* was the least used verb form in the narrative texts (0.4%).

Sociolinguistic research provided similar findings. Silva-Corvalán (1983) reported the prominent use of certain verb tenses in the narratives produced by Chilean and Mexican speakers. She observed that despite the frequent alternated use of the present [*presente*], the preterite [*pretérito perfecto simple*], and the imperfect [*pretérito imperfecto*] tense-aspect forms in the discourse, the preterite-present alternation emerged as the most prominent shift. Silva-Corvalán argued that, by bringing past events into the present time, it helped the speaker describe past events in a "more vivid and dramatic" (p. 775) manner, as if they were occurring in the present time in front of the narrator. Inspection of the language samples provided by Silva-Corvalán revealed that other tense-aspect forms, including the *condicional* and *pretérito pluscuamperfecto*, were produced by the speakers in conversation.

Bentivoglio (1987) and Bentivoglio and Sedano (1992) provide similar evidence confirming the use of the above tense-aspect forms (i.e., *presente*, *pretérito perfecto*

simple, pretérito imperfecto, condicional, and pretérito pluscuamperfecto) and, in the case of Bentivoglio and Sedano (1992), utterances indicate the presence of an additional form, the *pretérito perfecto compuesto*, in the informal spoken language samples of Venezuelan speakers. These tense-aspect forms used in informal conversation by Spanish speakers are summarized in Appendix A.

It is evident from the above description that Spanish verbs encapsulate both grammatical and semantic features in their structure, follow suprasegmental rules of the language, and are subject to discourse frequency patterns. Therefore, it is plausible to think that inflections appended onto the stem of Spanish verbs must undergo a complex retrieval process as the above factors interact in spoken inflectional production. In the following section, we will present evidence illustrating the agrammatic impairment of verb inflections in Spanish, particularly showing the preferred inflectional markings in the agrammatic speakers' oral narratives.

1.2 Agrammatic Verb Errors in Spanish

Research on the production of verb inflections by agrammatic Spanish speakers does not seem to be available in the literature. In fact, there is a considerable paucity in the aphasia literature on language disturbances more generally in the Spanish-speaking population. The only published study attempting to provide some insight into the use of verbal inflectional markings by Spanish-speaking aphasics was conducted by Schnitzer (1989). In this study of an undifferentiated aphasic group of monolingual Spanish and bilingual Spanish-English Puerto Rican individuals, the author reported inflectional errors in the spoken modality for most of the grammatical and semantic notions in the Spanish

verb structure described above. Findings, which included errors of tense-aspect, person, and number markings, were associated with a regression to a Givonian "pragmatic"³, "conversational interpretation" of language (p.140). An important observation provided by this investigation is that poor performance in some of the investigated tense-aspect forms, such as the future, conditional, and present perfect, might have resulted from their limited frequency in ordinary communication and the use of alternative verb forms to convey their meaning. For instance, the author suggests, the future tense is rarely used conversationally in Puerto Rican Spanish. Rather, the construction "*ir a*" (to be going + infinitive) is generally used instead. This finding is consistent with observations of informal, spoken Spanish in Venezuela (Sedano, 1994) and the verb form survey conducted by this author (Appendix C).

The unselected nature of the subject population in Schnitzer's investigation does not allow the advancement of any meaningful observations regarding verb use by Spanish-speaking agrammatic individuals. A preliminary attempt in this direction was provided by three agrammatic language samples collected by this investigator prior to this study. In this pilot study, three agrammatic individuals, each from a different Spanish-speaking country (namely, Mexico, Puerto Rico, and Venezuela), participated in picture description, storytelling, and conversation activities following a format similar to the one used by the Cross-Language Agrammatism Group (Menn and Obler, 1990). These samples, discussed in detail at the end of section 4.2 in the discussion, demonstrated that the first and third

³ In general terms, Givón (1979), looking at language from a phylogenetic and ontogenetic point of view, describes a communicative continuum consisting of three levels; a monopropositional level, restricted to time and space and associated with concrete concepts; a pragmatic level, involving conversational interpretation of sentences, and a syntactic level, responsible for morphosyntactic language descriptions.

person singular, and the third person plural for the present of the indicative (*Mejoro*/[I] get better, *Limpia*/[he,she] cleans, *Se caen*/[they] fall), the infinitive (*Dormir*/to sleep), and the -ing form (*Secando*/drying) were the only verb forms used by the speakers. In contrast, three normal individuals, matched with the agrammatic subjects for age and Spanish dialect, selected a wider range of verb forms than the agrammatic speakers in their narratives including additional mood and tense-aspect categories. These verb forms included the *presente* (*llevan*/[they] carry), the *préterito perfecto simple* (*hizo*/[he,she] made), the *préterito imperfecto* (*vivia*/[he,she] used to live), and the *préterito pluscuamperfecto* (*había sembrado*/[he,she] had planted) in the indicative mood, and some verb forms in the imperative mood (i.e., *¡váyase!*/go!). In addition, normal speakers, unlike their agrammatic counterparts, produced a great deal of auxiliary+ing constructions (e.g., *está sacando*/[he,she] is taking out).

The above language samples were collected to obtain a substantial corpus of utterances generated by selected agrammatic Spanish-speaking subjects. The primary purpose was to obtain an overall profile of the verb use patterns by these speakers without addressing the language mechanisms underlying the observed verb errors. The present investigation will, by contrast, systematically attempt to explore these mechanisms.

Having already looked at the structure of the Spanish verb system and its agrammatic impairment, we can now proceed to address the issues that have been proposed to explain agrammatic verb errors in speakers of languages of contrasting verb inflectional paradigms prior to the discussion of the additional conceptual bases that can be implicated in the study of agrammatic Spanish verb errors.

1.3 Theoretical Arguments on Agrammatic Verb Inflection Deficits

Several conceptual approaches have been advanced to explain agrammatic verb errors in English and in languages with more inflected verb systems, such as Icelandic, Hindi, Finnish, French, Italian, and Hebrew. Lapointe (1985), after an analysis of agrammatic language samples in English and Italian collected in earlier studies, suggests that inflectional verb errors by agrammatic individuals can be explained by the "morphosemantic complexity" encapsulated in each verb form. Essentially, each form involves a series of semantic notions which are hierarchically organized in terms of markedness principles and are expressed by the grammatical markers of the verb forms. Lapointe uses the principles advanced by Kurylowicz (1964) to rank the different types subsumed under each semantic notion. In this manner, the semantic notions encoded in the verb markers, namely, the speaker's attitude about the truth of a sentence, voice, aspect, tense, and agreement, can be hierarchically sequenced as follows (where "p < q means p is less marked or less complex than q"):

1. Attitude indicative < nonindicative
2. Voice active < passive < causative
3. Aspect nonspecific < durative < punctual, completive
4. Tense present < past, future < complex < nonfinite
5. Agreement subject < direct object
 - singular < plural < dual
 - 3person < 2person < 1person

Agrammatics would employ less complex verb forms, such as the bare stem " V " and the " V+ing " (i.e., go, going), as a result of their limited access to the above morphosemantic information.

Lapointe claims that deficient morphosemantic processing involves limited "resource" availability in the components of a "Syntactic Processor" (SP). In an attempt to extend Garrett's (1975)⁴ sentence production model, Lapointe suggests that a SP, consisting of three subcomponents and three types of stores, is involved in morphological processing between the functional and positional levels in Garrett's model. The verb deficit seen in agrammatism occurs when "devices" in the SP lack "sufficient resources to retrieve information from cells located as deep in the SP stores as would be required in the normally functioning speech system (p.137)."

While Lapointe's perspective advances worthy principles integrating both semantic and syntactic components in verb processing, his theory lacks clarity when explaining the interaction among the significant number of his proposed mechanistically-based processing stages and their intrinsic structure.

Another perspective is suggested by Stapp (1990) when she uses a tense-modality-aspect (TMA) analysis to explain English verb errors in agrammatism. To Stapp, verbs, "the core of the proposition" (p. 55), undergo a retrieval process largely based on conceptual operations to make the action communicated by a particular verb form suitable

⁴ To Garrett (1975, 1980), normal sentence processing involves four stages: message, functional, positional, and phonetic levels. In the message level, the conceptual representation or meaning of the sentence is processed and, then, transferred to the functional level, associated with the lexical entries to be used in the sentence and their semantic interactions. Next, information arriving from the functional level serves as the input for the positional stage in which the structural frame of the sentence is assembled, and the grammatical markers of the words involved and their stress designations are specified. Finally, following the positional level, the phonological form of the words is detailed in a phonetic level prior to the sentence's oral production.

to the time (tense), potentiality of action (modality), and completion/duration (aspect) characteristics required by the sentence type.

Stapp observed that when two English agrammatic speakers, one mild and one severe, were given oral expressive tasks to elicit 13 aspectual categories, their production of certain grammatical markers was more compromised for certain aspectual contexts than for others. For instance, the agrammatic speakers had more difficulty producing the copula-*be* when it was used in sentences involving the aspectual concepts of Identity (e.g., The boy is the grandchild) or Existence (e.g., There is/are ...) than in sentences involving the concepts of Property (e.g., The boy is tall) or Location (e.g., The boy is on the floor). In addition, errors displayed by the severe agrammatic speaker, namely, word order irregularities for the Durative and Imperative aspects (e.g., Today I Tony workin'/Today I was working at Tony's Pizza - p.126; Rubber band ... calculator/ Put the rubber band in the box - p.127), and nominalization errors for the Completive aspect (e.g., The money is pocket/The money is gone - p. 131), encouraged Stapp to argue that conceptual demands in verb retrieval can also lead to a breakdown at the propositional level.

Investigations in languages with significantly inflected verbs paradigms, such as Icelandic, Hindi, Finnish, French, Italian, and Hebrew, have provided further insights into the possible factors involved in verb inflection processing. Lorch (1990) observed that agrammatic verb errors can reflect intrinsic morphological, syntactic, semantic, and phonological features specific to a language. Analysis of the verb impairment profiles in the oral narrative texts generated by agrammatic speakers of Icelandic, Hindi, and Finnish

revealed that, although error patterns were characterized by verb omissions and inflection substitutions across all three languages, what was omitted or substituted differed among these three languages. Specifically, the Icelandic speakers, using a language with a complex verb inflectional system that involves number, person, gender, tense, voice, mood, and conjugation class, tended to avoid the use of bound morphemes to produce finite, inflected verb forms. Instead, they relied on inflected, free grammatical morphemes, such as the auxiliary, to express the most semantic meanings in the verb phrase. In contrast, the Hindi speaker, who did not produce agreement errors or rely on nonfinite, less inflected verb forms, used a semantically-based verb use pattern, favoring “less active” verb forms (p.178), like the perfective. Lorch’s findings did not support the use of less inflected verb forms over more inflected ones since both imperfective and perfective forms in Hindi are marked for the same number of grammatical categories; tense/aspect, gender, and number. Finally, the two Finnish subjects demonstrated a better performance than their Icelandic and Hindi counterparts since only one of these two speakers exhibited verb phrase difficulties when compared to the controls’ samples. In this case, errors primarily consisted of omissions of verb forms. These findings encouraged Lorch to argue that the morphologically agglutinative nature of Finnish verbs, in which tense, mood, voice, number, and person are attached to the stem, impose substantial processing demands on the agrammatic speaker. The use of the phonological rules in Finnish to turn the stem and its required inflectional option into a tightly bound “synthetic unit” (p.178) might have resulted in omissions of the entire verb form.

Lorch supports her concluding arguments on a reliance on nonfinite forms, the nominalization issue, and the impact of phonological processing in agrammatism. She argues that the performance by the Icelandic speakers supports the overreliance on nonfinite, less inflected verb forms as free morphemes rather than bound morphemes. In contrast, the Hindi sample supports the nominalization claim since this speaker tended to use “more stative and less active relational predicates” (p.180) in his utterances. Using Hopper and Thompson’s (1984) terminology, Lorch suggests that the perfective found in the Hindi texts has more of the referential and static noun-like characteristics than the expected imperfective considered verb-like in nature for having a relational and active meaning. Regarding the omissions of Finnish verbs, Lorch argues that the only possible explanation for these findings is a difficulty with the selection of inflections and/or stems as both lexical and inflectional morphemes are selected prior to their phonological realization. Therefore, a representation that is incompletely inflected cannot be uttered.

Verb use by agrammatic speakers of French and Italian, two other languages with significantly inflected verb paradigms, has also been investigated. Jarema and Kehayia (1992) argue that the mental organization of verbs might involve an uninflected stem to which those inflectional possibilities allowed for each stem of the verb can be appended. Their assertion is based on the errors for tense and aspect markers that agrammatic French-speaking subjects produced in repetition and sentence production tasks involving one- or two-root French verbs. Error patterns led these authors to claim that “lexical storage reflects the internal morphological structure and idiosyncrasies of verbal lexical items” (p. 559). In this manner, one-root verbs (e.g., *manger* (to eat): *mang-*) and their

inflectional options would be stored in one common storage unit whereas two-root verbs (e.g., *partir* (to leave): *par-* or *part-*) would have two separate, yet linked, storage units for each root and its respective inflectional options.

Jarema and Kehayia's investigation provided additional important evidence for the study of agrammatism. The variability in the types of substitutions generated by the subjects for the target inflections, for instance, the present and imperfect tenses for the past and future tenses for one-root verbs, and the infinitive for two-root verbs, demonstrated that the infinitive or the gerund are not the only verb forms to which agrammatic speakers might resort in their oral expression. Other inflections permitted by the wide range of inflectional possibilities in the paradigm of that particular verb can be erroneously accessed. Consistent with Jarema and Nespoulous (1984), who reported that the infinitive is not the only substituting form used by French-speaking agrammatics, Jarema and Kehayia's findings markedly contrast with the agrammatic reduction of verb use in English, a less inflected language than French, to two characteristic verb forms; the infinitive and *-ing* forms.

The inflected Italian verb system has also served as research context to address the question of verb inflections in agrammatism. In an investigation of the required gender and number markings of the past participle in Italian verbs, De Bleser and Luzzatti (1994) observed that the rate of success exhibited by agrammatic Italian-speaking subjects depended on the syntactic complexity of a sentence. Agrammatic subjects performed better in simple sentences than in complex sentences. In Italian, gender and number

inflectional assignment for the past participle requires the interpretation of the grammatical features of an appropriate antecedent, namely, a noun, a pronoun, or an empty element.

Based on the deficient inflectional marking of the past participle in complex sentences, De Bleser and Luzzatti claim that agrammatic speakers might not be able to access the full syntactic representation of the argument structure of verbs in complex sentences since the two subjects participating in the study used a minimal distance solution or a random selection to assign gender and number inflections to the past participle used in the sentence context. Further, the authors argue, an increased use of appropriate gender and number markings in the past participle in simple sentences as compared to complex ones does not support the "deletion of nonterminal elements" proposed by Grodzinsky (1990), which would have resulted in no morphological agreement in either simple or complex contexts. They place the possible locus of the impairment at the positional level in Garrett's (1980) sentence production model in which grammatical suffixes are mapped onto functional representations.

Finally, findings obtained in Hebrew, a language with a rich inflectional morphology, have also provided evidence to advance additional psycholinguistic explanations of agrammatic verb errors. Friedmann and Grodzinsky (1994), relying on results obtained from sentence completion and repetition tasks given to a Hebrew-speaking agrammatic, support Pollock's (1989) split Infl node theory. In this case study, the subject exhibited a better deployment of Agreement markers than Tense markers hence providing evidence that Tense and Agreement are represented in separate nodes in the syntactic tree (rather than together under Infl), as predicted by the theory.

The preceding arguments support that verb inflectional marking involves a complex process calling upon syntactic, semantic, and phonological operations. Authors suggested that agrammatic verb errors might be associated with an impaired access to verbal morphosemantic information (Lapointe, 1985), a processing difficulty imposed by the conceptual demands on the verb by sentential context (Stapp, 1990), a reliance on nonfinite, nominalized, or phonologically simple verb forms (Lorch, 1990), and a deficient interpretation of the verb's argument structure (De Bleser and Luzzatti, 1994). In terms of psycholinguistic organization for verbs, authors provided valuable accounts supporting the representation of verbs in the form of stem+inflection paradigms (Jarema and Kehayia, 1992) and the possible separate representation of Tense and Agreement markers in the syntactic tree (Friedmann and Grodzinsky, 1994).

The above studies confirm that explanatory principles of agrammatic verb errors can considerably be specified further by cross-linguistic research. In particular, as illustrated above, investigations in languages with complex verb inflection paradigms have expanded psycholinguistic explanations of verb processing. Use of languages with a morphologically simple verb system, such as English, with only five inflectionally distinct verb forms (i.e., base form [*go*], third person singular [*goes*], past tense [*went*], perfective participle [*gone*], and imperfective participle [*going*]), imposes limitations on the study of finite verb form production by agrammatic speakers. Spanish, a language with a highly inflected verb system, can serve as an ideal research context to further the current conceptual accounts on agrammatic verb impairment, particularly when additional variables, not addressed in earlier investigations, are examined.

In the next section, I will present evidence and arguments on conceptual principles not examined in previous research on agrammatic verb deficits. These principles can be invoked in the study of agrammatic verb errors in Spanish in order to extend and specify current explanations of agrammatic verb impairment.

1.4 The Spanish Verb Paradigm as a Research Context for Agrammatism

Explanatory arguments on agrammatic inflectional errors in Spanish verbs do not seem to be available in the literature. The above discussion on the Spanish verb paradigm suggests that Spanish, a language with a high degree of specification in verbs, can be used to expand the arguments proposed by the above cross-linguistic investigations of agrammatic verb performance. In particular, the Spanish verb paradigm, involving the processing of morphological and stress assignment features, and subject to discourse-related factors for appropriate verb inflectional production, illustrates the need to further specify the mechanisms proposed for verb inflectional use. Verb inflectional production, a complex process involving the interplay of various variables, seems to require more specific accounts than those previously proposed.

Before presenting the predictions to be investigated in this dissertation, I will first present findings and conceptual principles reported in earlier studies that will later be employed as the theoretical bases underlying the proposed factors to be studied in this research. I will start by presenting evidence on agrammatic simplification of the verb phrase. Then, I will discuss the role of frequency of occurrence in normal and aphasic language processing, and will conclude by addressing the impact that frequency patterns in

language acquisition and discourse, the notion of salience, and morphological complexity might have on agrammatic verb use.

1.4.1 Agrammatic Simplification of the Verb Phrase

Simplification of the verb phrase constituent has been reported to include the deletion of auxiliary verbs and the loss of verb inflection in several languages (Goodglass, 1973; Nespoulous, Dordain, Perron, Jarema, and Chazal, 1990; Miceli and Mazzucchi, 1990), the preferred use of past participles in compound auxiliary+past participle forms in Italian (Miceli and Caramazza, 1988) and in French (Jarema and Nespoulous, 1984), and the reliance on non-finite verbs and participial constructions in a cross-linguistic survey (Menn and Obler, 1990). Moreover, some investigators have linked the use of uninflected verb forms, such as the infinitive or the gerund in English (e.g., go, going), with a shift towards the production of nominalized verb forms (Goodglass and Geschwind, 1976). This claim, also supported by Saffran, Schwartz, and Marin (1980), is employed by Lorch (1990) to explain the increased use of the perfective by agrammatic Hindi speakers. Lorch argues that, despite both perfective and imperfective verb forms being marked for the same number of grammatical categories in Hindi, the preferred use of the perfective over the imperfective by an agrammatic Hindi speaker reflects the semantic properties of these two verb forms. The perfective has more of the referential and static noun-like features than the expected imperfective considered verb-like in nature for having a relational and active meaning.

The narrow range of verb inflections, the deletion of the auxiliary (in favor of participial units) in complex verb forms, and the possible nominalized meaning of verb

forms exhibited by agrammatic speakers suggest that explanatory accounts of agrammatic verb errors would benefit from a systematic analysis of the favored inflectional responses by agrammatic speakers. In particular, a contrastive examination of the morphosemantic features encapsulated in the inflectional options produced by the agrammatic speaker for simple verb forms would provide information on facilitating verb variables. In addition, a comparison of the correct production between simple verb forms and auxiliary+past participle compound forms would also add valuable information on the role of structural complexity in agrammatic verb use.

1.4.2 Lexical Frequency of Occurrence

The significance of frequency of occurrence of lexical items has not been addressed in investigations of agrammatic verb deficits. The importance of frequency of occurrence for lexical items has been extensively studied in normal language processing and aphasia. There is considerable evidence supporting the resistance of high-frequency forms to errors in language processing. For instance, Hall (1954) reported that high-frequency words are much easier to recall than low-frequency words in a free-recall task. In terms of aphasic language, Howes (1964) showed that aphasics favored the use of high-frequency vocabulary instead of low-frequency lexical items in their free speech. Rochford and Williams (1965) found that the effect of frequency of usage favoring high-frequency words held for both verbs and nouns in a pictured naming task given to aphasics. Goodglass (1976) and Stemberger (1984) suggest the possibility that the hierarchy of loss errors in agrammatism might be sensitive to usage frequency patterns. In particular, the plural suffix *-s*, the 3sg. pres. suffix *-s*, and the possessive clitic *-s* are differentially affected in this

order. The plural, the most frequent, is the least affected; the present, with an intermediate frequency, is moderately affected; and the possessive, the least frequent, is the most commonly affected. Finally, Miceli and Caramazza (1988) found that an Italian agrammatic speaker's word repetition was better for frequent units than for infrequent units.

Some psycholinguistic principles have been proposed to account for the resistance of high-frequency vocabulary to errors. Stemberger's (1986) analyses of spontaneous speech errors showed that high-frequency inflected forms are less susceptible to at least one type of inflectional error - the no-marking error (e.g., "need" for "needed"). These findings led the investigator to argue that frequency is encoded in terms of "strength" (p. 24) or degree of semantic or pragmatic activation which protects the item from error. Hence, high-frequency items, involving higher activation levels than low-frequency items, would be less vulnerable to phonological and inflectional errors than those forms with a low frequency.

In line with Stemberger's argument, Bybee (1985, 1995) similarly advances the notion of "strength" in morphological processing in the lexicon. Initially based on a survey of verb inflection usage in 50 languages⁵, Bybee (1985) argues a model of morphological processing in the lexicon grounded on two main issues; token frequency and type frequency. Token frequency defines an item's "lexical strength" (Bybee, 1995, p. 428) whereas type frequency defines an item's [morphological] productivity: "the strength of lexical representations of individual items is in part a reflection of token frequency, while

⁵ Bybee analyzed verb inflection in the 50 language samples chosen by Perkins (1980). In order to secure representative samples, Perkins tried to select languages that were not from the same language family or the same cultural or geographic areas.

the strength (and one determinant of productivity) of lexical associations or schemas is built up by type frequency (p. 452).” An item that occurs frequently in actual language usage, thus having a high token frequency, would have a high lexical strength, would be easy to access, have more morphological fusion, and exhibit an autonomy that makes it resistant to change and prone to semantic independence. Within a paradigm, these words with higher lexical strength serve as the bases for morphological relations and the formation of new words (Bybee, 1985). They form connection patterns of words sharing similar semantic and phonological features which reinforce one another and create schemas.

Schemas play an important role in productivity. To Bybee, if the schema is open, placing few restrictions on the items to which it can apply, its productivity will be greater. The other determinant of productivity is the strength of the schema, which is based on its type frequency - the higher the type frequency of the pattern described in the schema, the greater are its chances of applying to other new items.

Bybee illustrates her arguments using examples from different languages. For instance, in English, two irregular classes of approximately the same type frequency exhibit differences in productivity because one has more high-frequency members than the other. The *strung* class (e.g., strung, stung, flung, hung, etc.) with 13 members, whose total token frequency according to Francis and Kucera (1982) is 199, is much more productive than the *swept* class (e.g., wept, kept, etc.) which has 14 members with a total token frequency of 656. Similarly, also in English, schemas, such as the past *-ed* or plural

-s, are very productive since they are “totally open” (Bybee, 1995, p. 425). Finally, in Spanish and French, the verb conjugation class with the largest number of types (Spanish *-ar* verbs and French verbs such as *chanter* [to sing]) is associated with a lower token frequency and higher productivity compared to those conjugation classes with fewer verbs (Spanish *-er* and *-ir* verbs and French verbs such as *finir* [to finish] and *vendre* [to sell]) but a high token frequency in their verbs⁶. Bybee cites Guillaume’s (1973) work providing evidence that the verbs used by French-speaking children to generalize new verb forms did not correspond to the most frequently used verb class [high token frequency] (i.e., *vendre*) but the verb class that had the highest type frequency (i.e., *chanter*). All of the children studied overgeneralized the first conjugation class.

In sum, frequency of occurrence, not investigated in earlier studies of agrammatic verb errors, seems to be an important factor. The above discussion illustrated that high- and low-frequency lexical items, involving different degrees of morphological fusion, have a different “strength” to resist impairment.

1.4.3 Frequency Patterns in Spanish Acquisition and Discourse

Verb acquisition and discourse patterns can also be incorporated in the study of agrammatic verb impairment. In particular, the frequency patterns observed during the development of verb inflections in Spanish-speaking children and their usage patterns later observed in the discourse of Spanish-speaking adults deserve our attention. It is possible

⁶ However, a survey of the verb types in the Spanish word frequency list by Marquéz-Villegas (1975) revealed that 63.8% of the most frequently used verbs were of the *-ar* type, followed by 22.6% of the *-er* type, and 13.6% of the *-ir* type. These results, based on the informal utterances produced by pre-College students in Spain, suggest that, indeed, verbs of the first conjugation class (*-ar* verbs) can outnumber verbs of the second (*-er*) and third (*-ir*) conjugation classes in conversation. Hence, *-ar* type verbs can have a high token frequency.

that the frequency parallels observed in early acquisition and maintained in adult language usage might have an important role in facilitating the production of certain verb forms. There is reason to believe that forms acquired earlier are more “resistant to linguistic dissolution” than those forms emerging later in language development (Schnitzer, 1989).

Descriptive studies looking at the sequential acquisition of grammatical morphemes in Spanish appear to be in agreement that the first tense and inflection used by Spanish-speaking children is the present tense and the third person singular as suggested by the use of forms such as "*Habla*"[he/she speaks], "*Va*"[he/she goes, and "*Tiene*"[s/he has] (Gonzalez, 1980; Maéz, 1981; Kvaal, Shipstead-Cox, Nevitt, Hodson, and Launer, 1988). In addition, in terms of conjugation class, children, when given cloze tasks involving verbs, tended to regularize nonsense verbs using the "-ar" ending (Kernan and Blount, 1966) . This finding is further supported by investigations of both normal Spanish-speaking children and adults responding to sentence completion stimuli in which adults, significantly more than children, substituted “-ar” inflections for the obligatory “-er” and “-ir” markings required by invented nonsense verbs (Schnitzer, 1993).

Findings on narrative production in normal Spanish-speaking children and adults are consistent with the above observations. Sebastián and Slobin (1994), studying narrative production in children and adults, reported that Spanish children generated stories including some regularized verbs in the direction of the “-ar” ending (e.g., *caiba* for *caía* . See PRI in Appendix A). In terms of verb tense usage, Sebastián and Slobin reported findings consistent with Silva-Corvalán’s (1983) narrative texts from Spanish-speaking adults (see section 1.1.2 in “The Spanish Verb System”). These authors showed

that, despite an oscillation between the present and the past in choice of dominant tense until age 5, the present stabilized as the most frequently used tense in the narrative of the 9-year-old children, the oldest group of children in the study, and adults.

Bybee's (1985) survey of Spanish adult narratives provided further support to the above results and added valuable information on number markings in Spanish adult discourse. Consistent with the usage frequency patterns observed in children above, Bybee reported that the four most frequent verb forms in Spanish correspond to singular inflections for the present and past tenses in the indicative mood (*presente* [P] and *pretérito perfecto simple* [PR] in this study, Appendix A).

In sum, early verb acquisition patterns in Spanish seem to be reflected in adult discourse verb usage. Based on the argument suggesting a resiliency of early acquired language forms to impairment, studies on agrammatic verb deficits should also consider the implications that these observations might have on the facilitation of the production of certain verb inflections.

1.4.4 Phonological Saliency

Saliency (Goodglass, 1973) can also be invoked in the study of verb inflections in Spanish. Saliency, described as the phonological prominence given to language forms by, among some features, stress, has been argued as a crucial factor in enhancing the production of function words, affixes and syntactically complex items such as the negative auxiliary. Goodglass, Gleason, Bernholtz, and Hyde (1972) claim that the use of /-ɪz/ by agrammatic English-speaking subjects is retained relative to /-s/ and /-z/ due to saliency of the syllable. Gleason, Goodglass, Green, Ackerman, and Hyde (1975), based on the

increased production of stressed words compared to unstressed words in the initial position of a sentence, support that stress can be used by agrammatic speakers of English as a compensatory strategy. Similarly, Kean (1979) proposed that phonological words, words receiving stress markings, are retained in agrammatism because they participate in the stress configuration of the sentence.

1.4.5 Word Morphological Structure

The morphological structure of a word seems to have a crucial effect in aphasic word production. Miceli and Caramazza (1988) noted that an Italian-speaking agrammatic subject was able to repeat short, 4-6 phoneme words better than longer, 7-9 phoneme words. Findings reported by Libben (1990) on a single-case study of an English-speaking Broca's patient showed the speaker's ability to favor the repetition of words that did not involve phonological changes in the stem or the affix. The patient's errors tended to be in the direction of the canonical (or linguistically underlying) forms of the constituent morphemes of a complex word (e.g., irreparable/"repair", p. 23). In addition, Stark and Stark (1990) found that German-speaking Wernicke's patients, tested with naming and repetition tasks, exhibited great difficulty in word production as the number of syllables in the word increased. Also, in terms of the syllable, their production deteriorated as the later a syllable was positioned in a two- to five-syllable word. It is possible to think that a Broca's aphasic, sharing a characteristic clinical symptom of an impaired repetition with Wernicke's patients (Murdoch, 1990), might perform similarly in this task.

This section has presented some factors that can be implicated in the study of agrammatic verb errors - the differential production of auxiliary verbs (relative to main

verbs), the increased reliance on past participles over the auxiliary in compound verb forms, frequency of occurrence, frequency patterns in language acquisition and discourse, salience, and morphological complexity. In the next section, I will use these findings and theoretical principles to make some possible predictions regarding the production of verb inflections by Spanish agrammatics.

1.5 Predictions on Verb Deficits in Agrammatic Spanish Speakers

The preceding research findings and conceptual principles will be invoked in order to advance some hypotheses on agrammatic verb production in Spanish. These predictions will attempt to, first, address the possible factors causing a hierarchy of sparing in Spanish verb inflections, and, second, extend the explanatory variables proposed by earlier cross-linguistic investigations on verb inflectional performance by agrammatic speakers.

As we apply the above findings (section 1.4.1) to the Spanish verb paradigm, it is plausible to claim that the favored production of nonfinite, uninflected verb forms by agrammatic speakers will enhance the production of those verb forms involving less morphological complexity, such as simple tenses, when agrammatic Spanish-speaking patients are given verbs to repeat. Hence, the following prediction can be made:

1A) Compound verb forms are more likely to be impaired than simple forms.

Reports (section 1.4.1) on the deletion of auxiliary verbs and the increased use of participial elements, relative to auxiliary verbs, suggest a possible prominent reliance on the past participle over the auxiliary in the responses by agrammatic Spanish speakers when given compound auxiliary+past participle forms to imitate. In addition, the past participle, being a frequent form in the compound verb paradigm, will be less susceptible

to impairment as suggested by Stemberger's and Bybee's lexical strength arguments (section 1.4.2). We can predict the following:

1B) In compound forms, agrammatics' omissions or substitutions are likely to be of the auxiliary rather than the past participle.

2A) The past participle will be spared (Appendix B).

The Spanish language acquisition and discourse literature (section 1.4.3) reported that the present and past tenses appear early in development and, in adult daily conversation, these two tenses are the most frequently used. Also, in terms of conjugation class (section 1.4.2 and 1.4.3), both child and adult language studies showed that “-ar” inflections, the largest conjugation class, are often erroneously used by children and adults as substituting terminations. Stemberger's (1986) and Bybee's (1985, 1995) arguments correlating high frequency with high lexical strength, and Schnitzer's (1989) association of early acquisition with a resistance to language dissolution would predict the increased sparing of the present and the past tenses and “-ar” inflections relative to those verb forms acquired later and occurring less frequently in discourse. If frequency of daily usage is a significant factor in correct repetition, then we can make the following predictions:

2B) Inflections 1-12, 25-36, and 49-60 (Appendix B) will be best spared because presente (P) and pretérito perfecto simple (PR) are the most frequently used tenses in Spanish oral narratives.

If frequency of conjugation class use contributes to correct imitation of verb inflections, then we can hypothesize:

3A) Inflectional forms of the "-ar" type will be produced correctly more frequently than those of the "-er" or "-ir" type.

The above arguments correlating high lexical frequency with a resiliency to impairment can also be invoked to predict the following behavior in verb inflections in a repetition task. If frequency in the paradigm is important, then we can hypothesize:

3B) The inflections in paradigm slots 1, 25, 49, 34, 52, and 58 (Appendix B) would be best produced, followed by, for instance, inflections 4, 10, 13, 14 and, finally, the other forms in the simple tense paradigm.

In terms of phonological salience (section 1.4.4), stress might enhance the repetition of those inflections corresponding to the accented syllable. We can hypothesize the following:

4) Stressed inflections, such as tomé (7), comemos⁷ (28), and subimos (34), would be better spared than unstressed inflections, such as toma (3) and subo (49).

Libben's and Stark and Stark's findings (section 1.4.5), relating a word's morphological structure with repetition performance in aphasia, lead us to argue that agrammatic Broca's aphasics might likely repeat verbs in the direction of the verb's simplest, canonical form, which involves a shorter syllabic length in the inflection compared to more complex verb forms. We can specifically predict:

5) The shorter the syllabic length, the more likely the morpheme can be correctly produced. In this manner, "-o", as in to-mo (1), co-mo (25), and su-bo (49), would be easier to produce than "-emos", as in co-me-mos (28), and

⁷ Recall that the vowel receiving the stress marking has been underlined in those cases in which stress is not shown orthographically.

“-ábamos”, as in to-má-ba-mos (16).

The early acquisition of singular inflections and their frequent adult use in Spanish narratives (section 1.4.3) suggest that these inflections would be more likely to be produced correctly than plural inflections due to their overlearned nature (Schnitzer, 1989) and high lexical strength (Stemberger, 1986; Bybee, 1985, 1995) in a repetition task. We can predict the following:

6) Singular verb forms will be repeated correctly more frequently than plural verb forms.

In this section I have invoked some research findings and conceptual principles to make predictions on verb production by Spanish-speaking agrammatic subjects. Now, I will continue with the methodology that will be implemented to investigate the above predictions.

2. METHODS

2.1 Subjects

Twelve native Spanish-speaking subjects, six agrammatics and six controls, participated in this study of verb inflection production in agrammatism. All subjects gave written consent to their participation in the study in a “Consent Form” describing the experimental task, its benefits, and lack of risks to the subjects’ well-being. Both agrammatic and control groups were matched for age and premorbid Spanish dialect. The agrammatic subjects, whose profiles are shown in Table 2, were selected for this investigation using the guidelines specified by Menn and Obler (1990). Their background information was collected in a questionnaire (Appendix D) given to each of them. They presented the following general profile:

Background: Subjects, five men and one woman, were native monolingual Venezuelan Spanish speakers, between 19-61 years old, with an average range of 7 years of education. For the Venezuelan population, 6 years of formal education (primary school) was considered to be the average level of education. Subjects who were speakers of other languages were not included in this study.

Neurolinguistic Status: Subjects were agrammatic yet able to speak well enough so that they could generate at least phrases in the oral expressive tasks to be described below. Menn and Obler (1990, p.14) describe “agrammatic by clinical standards” as “being moderately non-fluent, having slow and halting speech, with three or four words being the usual maximum uninterrupted string.” For this particular investigation focusing

Table 2: Agrammatic Subject Profiles

Subject	Age	Gender	Education (yrs.)	Lesion Site	Etiology	Phrase Length
GB	26	male	7	left frontoparietal	infarct	3
AB	48	male	8	left MCA*	aneurysm	4
AJ	19	male	7	left frontal	infarct	4
JB	61	female	9	left frontal	infarct	4
MA	41	male	6	left frontotemporal	infarct	3
RB	43	male	6	left frontal	infarct	3

*MCA = middle cerebral artery

on verb inflection production, final participation in the study was allowed to those subjects whose rate of verb form production fell within the 40-90% range to avoid both floor and ceiling effects.

Comprehension was adequate for conversation. All efforts were made in the initial interaction to eliminate subjects with severe dysarthric limitations hindering their speech intelligibility. In addition, word finding deficits had to be mild enough so that connected speech could be elicited.

The Spanish version of the Boston Aphasia Examination (Goodglass and Kaplan, 1974) and its norms (Rosselli, Ardila, Florez, and Castro, 1990) were used to rate the subjects' auditory comprehension, repetition, phrase length, and naming abilities. In terms of dysarthric features in the subjects speech, oral agility, not given any Spanish norms (Rosselli et al., 1990), were assessed by the investigator using the stimuli provided for this purpose in the Spanish version of the test. The available norms (Rosselli et al., 1990) are meant to be viewed as approximations since the standardization population (speakers of Colombian Spanish) is different from the subject population that participated in this study (speakers of Venezuelan Spanish). In addition, the test, which was translated from English into Argentinean Spanish, was linguistically adjusted to the subjects' Venezuelan Spanish dialect for those instances in which there were lexical and sentence structure differences between the two Spanish dialects.

Medical History: All of the subjects had a single, unilateral, cortical, and left-sided lesion. Subjects had no history of alcohol or substance abuse, psychiatric illness, or learning disabilities. In addition their hearing was assessed to be within normal limits (i.e., at least

25-40dB in the better ear). Individuals with auditory deficits, even if corrected with amplification, were not included in the study.

Neuropsychological Status: The subjects were alert, cooperative, oriented, and not suffering gross cognitive impairment. They were able to attend and concentrate without serious fatiguing.

2.2 Procedures

2.2.1 Task

A sentence repetition task, involving 4 practice and 216 experimental stimuli, was employed to elicit the target verb forms. Subjects were instructed to repeat the sentences auditorily presented to them through headphones by a native Spanish speaker. The experimental sentences were audiotaped prior to presentation in order to have all subjects exposed to the same auditory input for each experimental sentence. In order to prevent any fatigue from the task, subjects were given a break in between each of the three (3) seventy two (72) sentence blocks indicated on the tape as “Descanso” [rest].

The sentence repetition task was illustrated to the subjects in two parts; first, without the headphones, and, second, with the headphones on. In the first part, the subject was able to listen to the actual sentence repeated by the investigator. The instructions, presented here in their English version, were: “I want you to listen to these sentences very carefully and repeat them after you hear them. Let me give you an example: “Yo canto una canción” [I sing a song]. You repeat the same sentence; “Yo canto una canción”. Here’s another one, listen first and then repeat (stressed statement), “Nosotros escribimos una carta ayer” [we wrote a letter yesterday]. You repeat the same sentence... (the

investigator waited for the subject to respond and, if necessary, in order to minimize his/her anxiety level, let him/her know that it was alright if the sentence was not entirely reproduced). Now, listen and repeat the sentences as you hear them with the headphones on. When you hear the word “Descanso” [rest], it is time to take a break”. (The investigator puts the headphones on the subject and monitors the tape recorder’s output through its speaker. The investigator does not use headphones so he can hear the subject’s response).

Two additional practice trials were presented to the subjects in the headphone condition before the administration of the three sentence blocks. Cueing was only provided in the form of the entire experimental sentence when subjects only reproduced the wrong part(s) of the sentence, such as the subject and/or the post-verb complements. Two instances of cueing were allowed to each subject.

Subjects were eliminated from the investigation when they did not understand the task after the trial sentences in either without- or with-headphone conditions. As mentioned in the selection criteria earlier, final participation in the study was allowed to those subjects whose rate of verb form production fell within the 40-90% range to avoid both floor and ceiling effects. Subjects’ responses were audiotaped for later transcription of their verb components.

2.2.2 Stimuli

Subjects were presented 216 sentences (Appendix E) constructed as follows: four sentences (4), one for each first and third singular and plural persons of the verb (i.e., I, s/he, we, they), for each of the six (6) tenses in each of the three (3) conjugation classes

for each of the three (3) verbs in these conjugation classes (i.e., $4 \times 6 \times 3 \times 3 = 216$). These 216 experimental sentences were pseudorandomized, such that the same person, verb, or tense never occurred twice in sequence. In order to prevent any fatigue in the subjects, the sentences were divided into three 72-sentence blocks ($3 \times 72 = 216$).

Six verb tenses in the indicative mood were selected: *presente* (P), *pretérito perfecto simple* (PR), *pretérito imperfecto* (PRI), *condicional* (C), *pretérito perfecto compuesto* (PRP), and *pretérito pluscuamperfecto* (PRC) (Appendix B). These tense-aspect forms were selected since they are the most prominently used by Spanish speakers in their daily discourse as discussed earlier.

The lexical items included in the sentences were high-frequency vocabulary. In particular, verbs, the target part of speech to be investigated, were high-frequency, relatively short in syllable length (i.e., 2-syllable infinitive), regular, and transitive. They were also imageable since they referred to concrete, nonabstract physical actions. In order to enhance the recall of the presented stimuli, efforts were made to construct short sentences with particularly short, 2-5 syllable post-verb complements.

A Spanish word frequency list (Márquez-Villegas, 1975), based on the informal utterances of students taking pre-College courses in Spain, was employed to select the high-frequency verbs for this study in order to eliminate confusion due to the subjects' lack of familiarity with the meaning of the verb. Although this list does not assign a numerical frequency value to each word, it groups them into three frequency levels. Verbs for this investigation were selected from the high-frequency level of the list. Other Spanish word frequency lists (Juilland and Chang-Rodríguez, 1964; González-Grullón, Cabanes,

and García, 1981; Morales, 1986) were not considered for this study since the language sources used for their development primarily included formal, written language, such as essays, plays, and novels, which did not reflect the informal, conversational nature or frequency of spoken use of the verbs addressed in this investigation.

2.2.3 Data Analysis

All the subjects' responses were audiotaped and only the verbs were transcribed by Speech/Language professionals, all native speakers of the subjects' Spanish dialect. The transcription was first conducted by the investigator and a second Speech/Language professional. Those utterances on which there was no agreement between the first two listeners were later transcribed by a third rater. When these instances occurred, the selected utterance was that one on which there was agreement between two listeners.

Those data on which there was no agreement among all three raters, specifically, unintelligible responses, were excluded from the analysis and treated as an unintelligible attempt. The analysis of the produced verb forms was conducted as follows;

a) Responses: The first intelligible verb response was included in the analysis. When semantic or literal paraphasias were generated, the analysis focused on the integrity of their inflections as described below. Attempts deemed unintelligible by all the raters were saved to be analyzed separately at a later date to see if their occurrence depended on the verb form. Responses were tallied for each correct and incorrect attempts of the target stimulus. Later, each of these attempts was coded for the integrity of its conjugation class (-ar, -er, -ir), tense-aspect (P, PR, PRI, C, PRP, PRC), mood (i.e., the indicative - the only mood used in the verbs in this study), and person (i.e., singular or plural), as well as daily

discourse frequency, paradigmatic frequency, stress, and syllabic length. The specific guidelines for this coding are described below.

b) *Coding: Simple Tenses* The integrity of the verb's conjugation class (CC), tense-aspect (TA), mood (M), and person-number (PN) inflectional markings was coded as correct (+) or incorrect (-) (Table 3). In addition, the subjects' specific response for each of these features was indicated since we were interested in investigating which responses, among the options available for each of these features, the subjects selected in their repetition. These option types would be *ar*, *er*, or *ir* for conjugation class; P, PR, PRI, etc. for tense-aspect; indicative, subjunctive, or imperative for mood; and first, second, and third persons in singular and plural for person-number markings (Table 1 and Appendix A).

Second, responses were coded for frequency in daily discourse (F-DIS) and in the paradigm (F-PAR), stress (S), and syllabic length (SL) relative to the target stimulus. As described in “The Spanish Verb System” (section 1.1), P and PR tense-aspects are frequently found in informal conversation whereas PRI, C, PRP, and PRC are infrequently used by Spanish speakers. Hence, tenses used in the subjects’ responses were coded as correct (+) or incorrect (-), relative to the target, and their specific instances (P, PR, PRI, etc.) were noted accordingly under daily discourse frequency type (F-DIS). Regarding paradigmatic frequency (F-PAR), the subjects’ responses for simple verb forms were the only forms coded since the hypothesis on paradigmatic frequency (hypothesis 3B) only included these verbs. In this case, each response was coded in terms of the number of times that an inflection occurred in the simple tense paradigm (Appendix B); namely, 3⁺X (e.g., “-ía” as in *comía*, *subía* in PRI), 2X (e.g., “-aba” as in *tomaba* in PRI), or 1X (e.g.,

“-a” as in *toma* in P). Again, a correct (+) or incorrect (-) code was given when the response was compared with the given target.

Inflectional stress (S) assignment was coded as correctly (+) or incorrectly (-) produced for each stressed (S) and unstressed (U) productions relative to the target stimulus. Remember that in Spanish, stress assignment can be graphically shown in the word (“*subía*” in PRI) or only acoustically detected upon production of the word (“*tomo*” in P). Finally, syllabic length (SL) was described as correct (+) or incorrect (-) repetitions of the three length types available in the target stimuli; namely, 1-syllable inflections (e.g., “-o” as *to-mo* in P), 2-syllable inflections (e.g., “-imos” as in “*co-mi-mos*” in PR), or 3⁺-syllable (e.g., “-ábamos” as “*to-má-ba-mos*” in PRI).

c) Coding: Compound Tenses The presence of an auxiliary and a past participle (Aux+PP) in the compound tenses imposed a different coding approach. In an Aux+PP verb form, Aux is inflected to indicate tense-aspect, mood, and person-number markings whereas the PP component, an impersonal verb form, is only inflected to show the conjugation class. For instance, Aux inflectional variation would include forms such as *he*, *ha*, *hemos*, and *han* (PRP and PRC in Appendix A). In contrast, PP would only indicate the conjugation class participial termination added to the stem as in *tom-ado*, *com-ido*, and *sub-ido* for *-ar*, *-er*, and *-ir*, respectively.

Regarding daily usage frequency, stress, and syllabic length, compound forms are all infrequently used in discourse and both Aux and PP are stressed. Their syllabic length depends on the number of syllables in the Aux and PP components.

An example (Table 3) is used to illustrate these coding guidelines. Notice that the actual response, *Como*, was coded as correct (+) for its conjugation class (CC), tense-aspect (TA), and mood (M) features since it shares all of them with the expected target, *Comemos*; namely, the *-er*, *presente (P)*, and *indicative (i)* markings, respectively. *Como* differs from the target *Comemos* in that it involves an incorrectly (-) produced person-number (PN) marking (i.e., *-o* for *-emos*). In terms of frequency, *Como*, unlike the given target, is a frequent form in the paradigm (F-PAR: $-/3^+X$) which corresponds to the *presente (P)*, a frequently used tense-aspect category (F-DIS: P). Finally, in contrast to the target, *Como* involves no stress (U) on the inflection (S: $-/U$), and a shorter syllabic length consisting of one syllable (SL: $-/1$). As pointed out earlier, recall that the vowel of the stressed syllable is underlined when stress is not orthographically shown.

Table 3: Response Coding

Response	Target	CC	TA	M	PN	F-PAR	F-DIS	S	SL
<u>Como</u>	<u>Comemos</u>	+/er	+/P	+/i	-/o	-/3 ⁺ X	+/P	-/U	-/1

Illustration of the coding guidelines when the subject produced a response (“Como”) which was different from the presented simple verb target stimulus (“Comemos”). Refer to the coding section for simple tenses for details (p. 40, 43).

3. RESULTS

The following results section is based on the responses produced by the agrammatic subjects. All the control speakers performed 100% correctly in all the experimental items.

The data were analyzed in two different stages to assess the strength of the variable proposed by each hypothesis. The first stage involved *all* of the scored responses produced by the six agrammatic subjects to either simple or compound verb presentations. It was considered preliminary in nature since it evaluated each variable independently without looking at variable interactions in verb inflectional assignment. In contrast, the second stage, *only* considering the subjects' responses to simple verb forms, was conducted in an attempt to specify the effect that interacting variables might have on the subjects' inflectional deployment.

3.1 Analysis of Responses to Simple and Compound Verb Stimuli

Agrammatic subjects in the current study produced an overall number of 944 scorable utterances. These utterances could be analyzed since they were generated as correct or incorrect attempts to produce the aurally-presented stimuli (Table 4). Their attempts involving unintelligible (N=3) or routinized (N=4) utterances were not considered for the analysis. Regarding routinized utterances, specifically, MA produced verb phrases (N=4) which were not included in the analysis because they involved formulaic verb expressions routinely found in formal written text (e.g., “Se ha dicho” [it's been said] for the target “Ella ha subido dos camas”).

Table 4: Performance Profiles For the Agrammatic Subjects

Subject	Intelligible Responses			N.A.	U	VP	Total
	Correct	Incorrect	Total				
GB	49	103	152	64	00	00	216
AB	51	107	158	55	03	00	216
AJ	93	99	192	24	00	00	216
JB	66	122	188	28	00	00	216
MA	29	86	115	97	00	04	216
RB	62	77	139	77	00	00	216
Total	350	594	944	345	03	04	1296

Data include the intelligible responses (N=944) used for the analysis and the instances in which the subjects did not generate an answer (N.A., N=345) or produced an unintelligible response (U, N=3) or a routinized verb phrase (VP, N=4).

3.1 Hypothesis 1A: Compound verb forms are more likely to be impaired than simple forms.

The data (Table 5) confirm this prediction. The total means of correct responses were higher for simple forms (37.5%) than for compound forms (6.0%). T-ratio tests of differences in proportions between simple and compound forms were calculated for each subject and for the overall subject group. All t-ratios were adjusted using the Bonferroni⁸ method. Individual t-ratios for each subject ranged from 4.26 to 6.34 and the overall subject group value was 12.75. Comparison of these t-values with a Bonferroni-adjusted critical t-value of 3.23 ($p_B < .01$) with $df=143,71$ revealed a significant difference between simple and compound forms in favor of simple forms since both individual subject and group values are higher than the critical Bonferroni t-value. Hence, simple verb forms were more frequently produced correctly than compound verb forms for each subject and for the overall subject group.

3.2 Hypothesis 1B: In compound forms, agrammatics' omissions or substitutions are likely to be of the auxiliary not of the past participle.

The data (Tables 6A-6F) support this prediction. Analysis of the number of omissions and substitutions for each auxiliary and past participle, employing the McNemar chi-square test for correlated proportions, provided a contrasting performance among subjects which did not affect the overall results. Specifically, GB, JB, and RB's chi-square values (13.13, 33.11, and 13.13, respectively) exceeded the critical value for an adjusted

⁸ A Bonferroni adjustment was conducted to control for familywise Type I error rate since the analyses were based on the same data for six interconnected hypotheses. A Bonferroni-adjusted p-value is indicated as p_B .

Table 5 Correct Production of Simple and Compound Forms by the Agrammatic Subjects

Subject	Correct Verb Response Type (%)	
	Simple Forms	Compound Forms
GB	32.6 (47/144)	2.7 (02/72)
AB	34.7 (50/144)	1.3 (01/72)
AJ	56.9 (82/144)	15.2 (11/72)
JB	40.9 (59/144)	9.7 (07/72)
MA	20.1 (29/144)	0.00
RB	39.5 (57/144)	6.9 (05/72)
Total	37.5 (324/864)	6.0 (26/432)

Percentage of correctly produced simple and compound verb forms by the agrammatic speakers. Note that out of the 216 experimental stimuli presented to each subject, 144 were simple verb forms and 72 were compound verb forms.

Table 6 Production of the Auxiliary and the Past Participle by the Agrammatic Subjects

Subject:		Aux			Total
GB		C	O	S	
PP	C	02	18	02	22
	O	02	21	02	25
	S	00	00	25	25
Total		04	39	29	72

Table 6A

Subject:		Aux			Total
AB		C	O	S	
PP	C	01	16	00	17
	O	04	34	05	43
	S	00	00	09	09
Total		05	50	14	69 ⁹

Table 6B

Subject:		Aux			Total
AJ		C	O	S	
PP	C	11	13	02	26
	O	09	14	02	25
	S	00	00	21	21
Total		20	27	25	72

Table 6C

Number of correctly (C) or incorrectly produced responses for each agrammatic speaker for the Auxiliary (Aux) or past participle (PP) in the target compound verb forms. Incorrectly responses are shown as omissions (O) or substitutions (S). Remember that all subjects were given 72 compound verb targets to reproduce. In the case of AB and MA, the total number of analyzed responses does not add up to 72 because each of these subjects produced unscorable productions for some compound verb targets (see Table 4).

⁹ AB produced 3 unintelligible responses for compound verb forms (see Table 4)

Table 6: Production of the Auxiliary and the Past Participle by the Agrammatic Subjects

Subject:		Aux			
JB		C	O	S	Total
	C	07	35	01	43
PP	O	01	16	07	24
	S	00	00	05	05
Total		08	51	13	72

Table 6D

Subject:		Aux			
MA		C	O	S	Total
	C	00	14	00	14
PP	O	02	44	02	48
	S	00	00	07	07
Total		02	58	09	69 ¹⁰

Table 6E

Subject:		Aux			
RB		C	O	S	Total
	C	05	20	00	25
PP	O	02	42	00	44
	S	00	00	03	03
Total		07	62	03	72

Table 6F

Number of correctly (C) or incorrectly produced responses for each agrammatic speaker for the Auxiliary (Aux) or past participle (PP) in the target compound verb forms. Incorrectly responses are shown as omissions (O) or substitutions (S). Remember that all subjects were given 72 compound verb targets to reproduce. In the case of AB and MA, the total number of analyzed responses does not add up to 72 because each of these subjects produced unscorable productions for some compound verb targets (see Table 4).

¹⁰ MA produced 4 formulaic verb phrases not used in the data analysis (see Table 4). Of these responses, 3 corresponded to compound verb forms.

Bonferroni chi-square value of 9.49 ($p_B < .01$) with $df=1$ in the predicted direction. In contrast, chi-square values for AB, AJ, and MA (6.05, 1.04, and 7.56, respectively) were lower than the critical chi-square value in opposition to our hypothesis. However, for the group overall, the chi-square value was significant (70.92). These findings are indicative of a higher susceptibility of the auxiliary to succumb to agrammatic impairment than the past participle in compound verb forms.

3.3 Hypothesis 2A: The past participle will be spared.

The above observations also serve to support the importance of paradigmatic frequency since the past participle is spared relative to the auxiliary, which occurs less frequently than the past participle in the compound verb form paradigm.

3.4 Hypothesis 2B: Inflections in paradigm slots 1-12, 25-36, and 49-60 (Appendix B) will be best spared because presente (P) and pretérito perfecto simple (PR) are the most frequently used tenses in Spanish oral narratives.

Findings (Table 7) strongly support the role of daily usage frequency in enhancing verb inflection production. Inspection of the data indicates that both P and PR were remarkably better produced than any other tense for each individual. Use of the t-ratio tests of differences in proportions of correct productions for P and PR tenses and the other four tenses showed that each subject and the entire subject pool produced a significantly greater number of correct responses for P+PR than they did for the other tense-aspect categories for a Bonferroni-adjusted t-ratio of 3.23 ($p_B < .01$) with $df=143$, 71. Specifically, t-ratios for individual subjects ranged from 5.28 to 10.73, with a

Table 7 Production of Tense-Aspect Markings

Subject	Correctly Produced Tense-Aspect Inflections (%)					
	P	PR	PRI	C	PRP	PRC
GB	55.5 (20/36)	44.4 (16/36)	19.4 (07/36)	11.1 (04/36)	5.5 (02/36)	00
AB	50.0 (18/36)	41.6 (15/36)	25.0 (09/36)	22.2 (08/36)	2.7 (01/36)	00
AJ	69.4 (25/36)	75.0 (27/36)	44.4 (16/36)	38.8 (14/36)	30.5 (11/36)	0
JB	86.1 (31/36)	61.1 (22/36)	00	16.6 (06/36)	8.3 (03/36)	11.1 (04/36)
MA	33.3 (12/36)	25.0 (09/36)	13.8 (05/36)	8.3 (03/36)	00	00
RB	61.1 (22/36)	52.7 (19/36)	22.2 (08/36)	22.2 (08/36)	11.1 (04/36)	2.7 (01/36)
Total	59.2 (128/216)	50.0 (108/216)	20.8 (45/216)	19.9 (43/216)	9.7 (21/216)	2.3 (05/216)

Correctly produced tense-aspect markings for each type included in the study. Note that each subject was given 36 sentences for each tense-aspect category.

composite value of 17.62 for the entire group of agrammatic respondents thus suggesting that the greater the daily frequency of a verb form, the more likely it is to be spared in agrammatic speakers of Spanish.

3.5 Hypothesis 3A: Inflectional forms of the “-ar” type will be produced correctly more frequently than those of the “-er” or “-ir” types.

Subjects exhibited a similar performance producing inflections of the three conjugation classes correctly (Table 8). A one-way ANOVA performed on the number of correct responses for each class showed no significant differences among the means of the three conjugation categories since the obtained $F = 1.64$ for the ANOVA was lower than the critical value $F=3.1$ ($p_B < .01$) with $df=2,10$. If anything, one may see from the order in the percentages of correct responses in the basic data that *-er* and *-ir* inflections were employed correctly marginally more frequently than *-ar* inflections.

3.6 Hypothesis 3B: The inflections in paradigm slots 1, 25, 49, 34, 52, and 58 (Appendix B) would be best produced, followed by, for instance, 4, 10, 13, 14 and, finally, the other forms in the simple tense paradigm.

The data (Table 9) are consistent with this prediction. Overall means for the correct productions were 28.2% for items mentioned three or more times (3^+X) in the paradigm, 25.6% for items mentioned twice ($2X$), and 18.2% for items mentioned only once ($1X$). Comparison of these means using a one-way ANOVA showed significant Bonferroni-adjusted differences among them. The obtained $F= 169$ for the ANOVA was higher than the critical value $F=13.1$ ($p_B < .01$) with $df=2,10$. Further, a Scheffé analysis revealed significant differences for 3^+X-1X and $2X-1X$ but no significant differences for

Table 8 Production of Inflectional Endings for Each Theme Vowel Class

	-ar	-er	-ir
GB	23.6 (17/72)	29.1 (21/72)	15.2 (11/72)
AB	20.8 (15/72)	26.3 (19/72)	23.6 (17/72)
AJ	41.6 (30/72)	45.8 (33/72)	41.6 (30/72)
JB	27.7 (20/72)	31.9 (23/72)	31.9 (23/72)
MA	12.5 (09/72)	13.8 (10/72)	13.8 (10/72)
RB	22.2 (16/72)	27.7 (20/72)	36.1 (26/72)
Total	24.7 (107/432)	29.1 (126/432)	27.0 (117/432)

Correct production of inflections by the agrammatic speakers for each conjugation class (-ar, -er, and -ir). Recall that each subject was given 72 stimuli for each conjugation class to repeat.

Table 9 Production of Inflectional Markings for Each Frequency Type in the Simple Tense Paradigm

Subject	Frequency Type for Inflections in the Paradigm		
	3 ⁺ X	2X	1X
GB	24.2 (16/66)	20.3 (22/108)	21.4 (11/42)
AB	30.3 (20/66)	22.2 (24/108)	14.2 (6/42)
AJ	37.8 (25/66)	40.7 (44/108)	30.9 (13/42)
JB	18.1 (12/66)	34.2 (37/108)	23.8 (10/42)
MA	22.7 (15/66)	10.1 (11/108)	7.1 (3/42)
RB	36.3 (24/66)	25.9 (28/108)	11.9 (5/42)
Total	28.2 (112/396)	25.6 (166/648)	18.2 (46/252)

Percentage of correctly supplied inflections for each frequency type in the simple tense paradigm. Notice that percentages were calculated using as the denominator the total number of inflections available in the simple tense paradigm for each frequency category; inflections occurring three or more times (3⁺X), twice (2X), or once (1X). The simple tense verb paradigm included the four simple verb tenses used in daily discourse: presente, pretérito perfecto simple, pretérito imperfecto, and condicional (refer to section 1.1, “The Spanish Verb System”, and Appendix B).

3^+X-2X for $F=5.12$ ($p_B < .01$) with $df=2,10$. Thus, agrammatic speakers of Spanish are more likely to correctly use verb inflections that occur more than once in the simple tense paradigm.

3.7 Hypothesis 4: Stressed inflections would be better spared than unstressed inflections.

The data (Table 10) do not support this prediction. Comparison of the number of correctly stressed and unstressed responses revealed that, except for MA, all agrammatic speakers produced unstressed inflections correctly *more* frequently than stressed inflections relative to the target inflections that they were given to repeat.

3.8 Hypothesis 5: The shorter the syllabic length, the more likely the morpheme will be correctly produced.

The data (Table 11A-11F) support this prediction. A one-way ANOVA revealed significant differences among the three syllable length means. Comparison of the F-value obtained in the ANOVA, $F=35.7$, with the critical F-value, $F=13.1$ ($p_B < .01$) with $df=2,10$, supports significant differences among the three means since the obtained F-value was higher than the critical F-value. Further, a Scheffé analysis showed a significant difference between 1- and 3^+ -syllable inflections but no difference between 1- and 2-syllable or 2- and 3^+ -syllable inflections for $F=5.12$ ($p_B < .01$) with $df=2,10$. Hence, it can be said that agrammatic Spanish speakers are more likely to reproduce correctly those inflections that are one syllable long as compared to those that are three syllables long.

Table 10 Correct Production of Stressed and Unstressed Inflections

Subject	% Correct Responses	
	+	-
GB	57.6 (109/189)	74.7 (20/27)
AB	68.2 (129/189)	88.8 (24/27)
AJ	84.1 (159/189)	96.2 (26/27)
JB	83.5 (158/189)	92.5 (25/27)
MA	40.7 (77/189)	37.0 (10/27)
RB	58.2 (110/189)	88.8 (24/27)
Total	65.4 (742/1134)	79.6 (129/162)

Overall percentage of inflections correctly stressed (+) or unstressed (-) relative to the total number of stressed or unstressed stimuli given to each agrammatic subject and to the entire agrammatic group.

Table 11 Syllabic Length in the Agrammatic Subjects' Responses

Subject: GB		Response				Number of Stimuli
		1-Syllable	2-Syllable	3 ⁺ -Syllable	NR	
Target	1-Syllable	37	01	00	07	45
	2-Syllable	18	16	00	20	54
	3 ⁺ -Syllable	25	41	14	37	117
Total		80	58	14	64	216

Table 11A

Subject: AB		Response				Number of Stimuli
		1-Syllable	2-Syllable	3 ⁺ -Syllable	NR	
Target	1-Syllable	40	03	00	02	45
	2-Syllable	07	43	00	04	54
	3 ⁺ -Syllable	11	50	04	49	114
Total		58	96	04	55	213 ¹¹

Table 11B

Subject:		Response				Number of Stimuli
AJ		1-Syllable	2-Syllable	3 ⁺ -Syllable	NR	
Target	1-Syllable	43	01	00	01	45
	2-Syllable	06	42	04	02	54
	3 ⁺ -Syllable	16	42	38	21	117
Total		65	85	42	24	216

Table 11C

Number of inflections produced by the agrammatic subjects in their responses for each syllabic length used in the target stimuli. The total number of stimuli used in the experiment for each inflectional syllabic length is shown.

¹¹ AB produced 3 unintelligible responses (refer to Table 4).

Table 11: Syllabic Length in the Agrammatic Subjects' Responses

Subject:		Response				Number of Stimuli
JB		1-Syllable	2-Syllable	3 ⁺ -Syllable	NR	
Target	1-Syllable	38	05	00	02	45
	2-Syllable	05	44	03	02	54
	3 ⁺ -Syllable	31	49	13	24	117
Total		74	98	16	28	216

Table 11D

Subject:		Response				Number of Stimuli
MA		1-Syllable	2-Syllable	3 ⁺ -Syllable	NR	
Target	1-Syllable	29	05	00	12	45
	2-Syllable	17	10	00	27	54
	3 ⁺ -Syllable	19	30	06	58	113
Total		63	46	06	97	212 ¹²

Table 11E

Subject: RB		Response				Number of Stimuli
		1-Syllable	2-Syllable	3 ⁺ -Syllable	NR	
Target	1-Syllable	41	02	00	02	45
	2-Syllable	04	39	00	11	54
	3 ⁺ -Syllable	03	37	13	64	117
Total		48	78	13	77	216

Table 11F

Number of inflections produced by the agrammatic subjects in their responses for each syllabic length used in the target stimuli. The total number of stimuli used in the experiment for each inflectional syllabic length is shown.

¹² MA produced 4 formulaic verb phrases (refer to Table 4)

3.9 Hypothesis 6: Singular verb forms will be repeated correctly more frequently than plural verb forms.

The data (Table 12) support this prediction. A one-way ANOVA, performed on the total number of correct responses for each singular and plural instances, showed differences between the two groups to be significant in the direction of singular responses. The obtained F-value for the ANOVA, $F= 25.3$, was higher than the critical F-value, $F=16.26$ ($p_B < .01$) with $df=1,5$. Hence, our agrammatic speakers were more prone to use singular verb forms in their responses thus supporting that number in agrammatic verb inflectional use can be an important factor.

Summary

The above results, considering each variable in isolation, suggest that conjugation class does not play a crucial role in verb inflection repetition. Verb forms will be repeated correctly by Spanish agrammatic speakers when they are

- simple forms rather than compound forms,
 - past participles rather than the Aux+PP form in compound verb tenses, and
- they involve inflectional markings that are
- unstressed,
 - frequent in both paradigm and daily discourse,
 - 1-syllable rather than 3⁺-syllables long, and
 - singular rather than plural.

Table 12 Correct Production For Each Number Category

Subject	Singular	Plural
GB	30.5 (33/108)	14.8 (16/108)
AB	39.8 (43/108)	7.4 (08/108)
AJ	57.4 (62/108)	28.7 (31/108)
JB	35.1 (38/108)	25.9 (28/108)
MA	18.5 (20/108)	8.3 (09/108)
RB	40.7 (44/108)	16.6 (18/108)
Total	37.0 (240/648)	16.9 (110/648)

Percentage of correctly produced singular and plural verb forms. Notice that each agrammatic subject was given a total of 108 experimental stimuli in each singular and plural.

Further analysis, this time considering all variables in interaction (i.e. compound form vs. simple forms, daily usage frequency, paradigmatic frequency, stress, syllabic length, and number), revealed a significant degree of correlation among them. Fisher-Z transformations of Pearson-r correlations among the variables representing the proposed hypotheses showed a significant degree of correlation, with the largest correlation value being for hypotheses 1A and 6 (simple/compound forms and singular/plural forms, $r=.92$), and the smallest for hypotheses 1B and 4 (omissions/substitutions of the auxiliary and stressed/unstressed inflections, $r=.62$).

3.2 Analysis of Responses to Simple Verb Stimuli

Our next step was to attempt to specify the importance of each proposed variable in facilitating the repetition of certain verb inflectional endings. In this manner, the data for simple verb forms were analyzed to see how effective those variables found to be significant in the first analysis - daily usage frequency, paradigmatic frequency, stress, syllabic length, and number - were in the production of the inflectional markings in the agrammatic subjects' responses.

The analysis was initiated by pairing each of the above five variables with each other to assess the amount of overlap in the experimental stimuli for each level of measurement. For instance, the number of stimuli that were both 1-syllable and singular was determined, and similarly for all the other pairs of variables, at all of their different levels of measurement (see Tables 14A-14J). These numbers were examined using chi-squares to determine whether the number of stimuli in each category of measurement was proportional to the total number of stimuli presented for that category (an illustration will

be given below). The chi-square values for the ten combinations of variables are presented in Table 13. The cell values on which these results are based appear on Tables 14A-14J.

Notice that the chi-square values in Table 13 are based on the stimuli for presentation, and do not reflect accuracy of reproduction of those stimuli. The chi-square value in the table represents the degree of disproportionality between the number of stimuli in the category and the marginal totals or whether certain cells had more (or less) than their proper portion of the total stimuli: a large chi-square value represents a large disproportion between the presented number of stimuli for a category of measurement and the marginal totals. For example, the numbers of stimuli representing Number X Daily Frequency (Table 14E) were the same for all the levels of measurement (i.e., 36) hence being proportional to the total number of stimuli of presentation for each category of measurement (i.e., 72 for singular and plural, and for P+PR and Other Tenses). As a result, the chi-square value (or the degree of disproportionality) for these two variables is 0 (Table 13) which suggests that the effects of disproportionality with regard to this variable interaction are minimal. On the other hand, when we look at the number of stimuli for Syllabic Length X Daily Frequency (Table 14B), the numbers are disproportional, with a corresponding chi-square value of 90.0 for this variable pair. This chi-square value for Syllabic Length X Daily Frequency is higher than 13.82, the Bonferonni chi-square for 2 degrees of freedom ($p < .01$), suggesting statistical significance. In this case, due to this disproportionality, outcomes suggesting differences in means for these two variables must be looked at with great caution.

Table 13: Chi-square Values for the Variables Interacting in the Experimental Stimuli

	Number	Daily Usage Frequency	Stress	Paradigmatic Frequency
Length	12.0 (2)	90.0 (2)	73.6 (2)	34.8 (4)
Number	-	0.0 (1)	5.4 (1)	2.6 (2)
Daily Usage Frequency	-	-	33.2 (1)	2.2 (2)
Stress	-	-	-	9.6 (2)

Chi-square values computed for the experimental stimuli involving each variable intersection in Table 14A-14J. The number of degrees of freedom for each chi-square value is given in parentheses. Bonferonni-adjusted chi-square values for 1, 2, and 4 degrees of freedom ($p < .01$) are 10.83, 13.82, and 18.47, respectively.

Table 14: Variable Pairings Used in the Analysis of the Responses to Simple Verb Stimuli

LENGTH	NUMBER		
	Singular	Plural	All
1-Syllable	70.8 (36)	57.3 (09)	68.1 (45)
2-Syllable	28.6 (18)	27.8 (36)	28.1 (54)
3 ⁺ -Syllable	31.5 (18)	9.3 (27)	18.1 (45)
All	50.5 (72)	24.5 (72)	37.5 (144)

Table 14A: Length X Number

LENGTH	DAILY USAGE FREQUENCY		
	P+PR	Other Tenses	All
1-Syllable	68.1 (45)	0 (0)	68.1 (45)
2-Syllable	31.5 (27)	24.6 (27)	28.1 (54)
3 ⁺ -Syllable	0 (0)	18.1 (45)	18.1 (45)
All	54.3 (72)	20.6 (72)	37.5 (144)

Table 14B: Length X Daily Usage Frequency

Overall production of correct responses for the agrammatic subject group for each category of measurement in the variable pairing. Percentages are shown in bold and the total number of experimental stimuli used are shown in parentheses. Cells showing no data correspond to those instances for which there were no stimuli with the features represented in the table.

Table 14: Variable Pairings Used in the Analysis of the Responses to Simple Verb Stimuli

LENGTH	STRESS		All
	Unstressed	Stressed	
1-Syllable	69.1 (27)	66.6 (18)	68.1 (45)
2-Syllable	0 (0)	28.1 (54)	28.1 (54)
3 ⁺ -Syllable	0 (0)	18.1 (45)	18.1 (45)
All	69.1 (27)	30.1 (117)	37.5 (144)

Table 14C: Length X Stress

LENGTH	PARADIGMATIC FREQUENCY			All
	1X	2X	3 ⁺ X	
1-Syllable	70.8 (08)	67.5 (22)	67.8 (15)	68.1 (45)
2-Syllable	22.1 (03)	25.0 (22)	31.0 (29)	28.1 (54)
3 ⁺ -Syllable	10.6 (11)	20.6 (34)	0 (0)	18.1 (45)
All	34.1 (22)	35.0 (78)	43.5 (44)	37.5 (144)

Table 14D: Length X Paradigmatic Frequency

Overall production of correct responses for the agrammatic subject group for each category of measurement in the variable pairing. Percentages are shown in bold and the total number of experimental stimuli used are shown in parentheses. Cells showing no data correspond to those instances for which there were no stimuli with the features represented in the table.

Table 14: Variable Pairings Used in the Analysis of the Responses to Simple Verb Stimuli

NUMBER	DAILY USAGE FREQUENCY		
	P+PR	Other Tenses	All
Singular	70.8 (36)	30.1 (36)	50.5 (72)
Plural	38.0 (36)	11.1 (36)	24.5 (72)
All	54.3 (72)	20.6 (72)	37.5 (144)

Table 14E: Number X Daily Usage Frequency

NUMBER	STRESS		
	Unstressed	Stressed	All
Singular	75.0 (18)	42.3 (54)	50.5 (72)
Plural	57.3 (09)	19.8 (63)	24.5 (72)
All	69.1 (27)	30.1 (117)	37.5 (144)

Table 14F: Number X Stress

Overall production of correct responses for the agrammatic subject group for each category of measurement in the variable pairing. Percentages are shown in bold and the total number of experimental stimuli used are shown in parentheses. Cells showing no data correspond to those instances for which there were no stimuli with the features represented in the table.

Table 14: Variable Pairings Used in the Analysis of the Responses to Simple Verb Stimuli

NUMBER	PARADIGMATIC FREQUENCY			
	1X	2X	3+X	All
Singular	70.8 (08)	46.5 (43)	50.8 (21)	50.5 (72)
Plural	13.1 (14)	21.0 (35)	37.0 (23)	24.5 (72)
All	34.1 (22)	35.0 (78)	43.5 (44)	37.5 (144)

Table 14G: Number X Paradigmatic Frequency

DAILY USAGE FREQUENCY	STRESS		
	Unstressed	Stressed	All
P+PR	69.1 (27)	45.5 (45)	54.3 (72)
Other Tenses	0 (0)	20.6 (72)	20.6 (72)
All	69.1 (27)	30.1 (117)	37.5 (144)

Table 14H: Daily Usage Frequency X Stress

Overall production of correct responses for the agrammatic subject group for each category of measurement in the variable pairing. Percentages are shown in bold and the total number of experimental stimuli used are shown in parentheses. Cells showing no data correspond to those instances for which there were no stimuli with the features represented in the table.

Table 14: Variable Pairings Used in the Analysis of the Responses to Simple Verb Stimuli

DAILY USAGE FREQUENCY	PARADIGMATIC FREQUENCY			
	1X	2X	3+X	All
P+PR	57.5 (11)	54.3 (35)	53.1 (26)	54.3 (72)
Other Tenses	10.6 (11)	19.3 (43)	29.6 (18)	20.6 (72)
All	34.1 (22)	35.0 (78)	43.5 (44)	37.5 (144)

Table 14I: Daily Usage Frequency X Paradigmatic Frequency

STRESS	PARADIGMATIC FREQUENCY			
	1X	2X	3+X	All
Unstressed	88.8 (03)	64.3 (09)	67.8 (15)	69.1 (27)
Stressed	25.5 (19)	31.1 (69)	31.0 (29)	30.1 (117)
All	34.1 (22)	35.0 (78)	43.5 (44)	37.5 (144)

Table 14J: Stress X Paradigmatic Frequency

Overall production of correct responses for the agrammatic subject group for each category of measurement in the variable pairing. Percentages are shown in bold and the total number of experimental stimuli used are shown in parentheses. Cells showing no data correspond to those instances for which there were no stimuli with the features represented in the table.

In sum, Table 13 shows that length is significantly involved with daily usage frequency, stress, and paradigmatic frequency whereas daily usage frequency is involved with stress.

Now, we can proceed to compare the correct responses for each variable pair.

Length

The interaction of length with number, daily frequency, stress, and paradigmatic frequency (Table 14A-14D) was assessed:

Length X Number (Table 14A): Results show that the percentage of correct responses decreases for plural simple verbs as syllabic length increases. In the case of singular forms, the decrease is not as marked as that seen in plural forms. There is a decrease in the number of correctly produced singular inflections when 1-syllable inflections (70.8%) are compared with 2- (28.6%) and 3⁺-syllable (31.5%) inflections. However, the trend is as linear as the one seen for the plural inflections (57.3%-9.3%). Also, in terms of number, we can observe that the range of successful reproduction of verb inflections was higher for singular verbs (70.8%-31.5%) than for plural verbs (57.3%-9.3%). Overall, results support that short inflections and singularity enhance the likelihood of correct verb reproduction as illustrated by 1-syllable, singular inflections with the highest proportion of correct responses (70.8%).

Length X Daily Usage Frequency (Table 14B): Despite the discontinuity in the data shown on the table for this variable pairing, due to the lack of presentations in some cells, it can be seen that long syllabic combinations decreased the likelihood of correct verb inflection reproduction by the agrammatic subjects for both frequently used (P+PR) and infrequently

used (Other Tenses) verb inflectional markings. Frequently used markings showed the highest percentages of successful reproduction (P+PR: 68.1%-31.5%) compared to infrequently used markings (Other Tenses: 24.6%-18.1%). In particular, for 2-syllable inflections, the only instance that allows us to assess the joint effect of length and daily usage frequency, frequently-used inflections (31.5%) were slightly more likely to be repeated correctly than infrequently used inflections (24.6%).

Length X Stress (Table 14C): Data discontinuity in this table does not allow for a complete comparison among the different cells. However, the available results, in agreement with the above findings, point to the diminishing effect that a long syllabic length in the inflectional ending can have on the inflection's reproduction by agrammatic subjects. As supported by the stressed category, agrammatic speakers could reproduce shorter inflections correctly more often than longer inflections, with percentages ranging from 66.6%, for 1-syllable markings, to 18.1%, for 3⁺-syllable markings. However, we notice that, for 1-syllable inflections, the only length category for which we can compare unstressed and stressed inflections, stress or its lack does not seem to have a differential enhancing effect in inflection reproduction since the performance rate was very similar for both categories (69.% vs. 66.6%).

Length X Paradigmatic Frequency (Table 14D): Consistent with the above variable interactions with length, an increasing syllabic length hindered the reproduction of verb inflectional markings by agrammatic speakers, as supported by the decrease in percentage values as syllabic length increased across all paradigmatic frequency categories.

Performance ranged from 70.8% to 20.6%. In contrast, the performance rate for

paradigmatic frequency did not demonstrate a profile as consistent as that seen for syllabic length across all paradigmatic frequency categories. Percentage values among the three frequency categories were very similar for 1-syllable inflections (70.8%, 67.5%, and 67.8%) and only showed an increasing tendency for 2-syllable and 3⁺-syllable inflections as the frequency in the paradigm also increased (22.1%-31.0% for 2-syllable inflections, and 10.6%-20.6% for 3⁺-syllable inflections). All in all, despite an increasing tendency in percentage values for paradigmatic frequency for 2- and 3⁺-syllable markings, a short syllabic length showed a stronger enhancing effect than increasing paradigmatic frequency values since the performance rate was clearly larger for 1-syllable inflectional endings (70.8%-67.8%) than for 2- and 3⁺-syllable inflections (22.1%-31.0% for 2-syllable inflections, and 10.6%-20.6% for 3⁺-syllable inflections) among all paradigmatic frequencies.

In summary, length seems to interact with number and daily usage frequency to enhance verb inflection reproduction by agrammatic Spanish-speakers. Specifically, Spanish verb inflections consisting of a short syllabic length corresponding to singular and frequently used verb forms are most likely to be successfully reproduced by agrammatic speakers.

Number

Next, number was paired with daily usage frequency, stress, and paradigmatic frequency (Table 14E-14G) showing the following results:

Number X Daily Usage Frequency (Table 14E): Findings suggest that singularity increases the likelihood of agrammatics repeating verb inflections since percentage values decrease

when plural inflections are presented to the agrammatic subjects. Notice that performance ranged from 70.8% to 11.1% from to singular to plural stimulus presentations. In addition, frequent daily usage has a similar enhancing effect since percentage values were higher for “P+PR” (70.8%-38.0%), frequently used verb tenses, relative to “Other Tenses” (30.1%-11.1%), tenses infrequently employed in conversation. The enhancing effect of both singularity and frequent usage is illustrated by the markedly higher performance rate seen in singular, frequent inflections (70.8%) than that in plural, infrequent inflections (11.1%).

Number X Stress (Table 14F): Unstressed inflections, overall, were more likely to be reproduced correctly than stressed inflections (75.0%-57.3% vs. 42.3%-19.8%). Similarly, singular endings were successfully reproduced more often than plural endings (75.0%-42.3% vs. 57.3%-19.8%). When both unstressed and singularity are combined, verb inflections show the highest rate of reproduction and stressed and plurality combined the lowest (75.0% vs. 19.8%).

Number X Paradigmatic Frequency (Table 14G): Findings support that singular inflections were spared more often than plural inflections across all paradigmatic frequencies. Findings also revealed that, despite a successful reproduction of the verb inflection towards the more frequent inflections in the paradigm for plural inflections (13.1%-37.0%), the highest performance rate was observed for singular, infrequent inflections (70.8%) thus suggesting that singularity plays a more crucial role than paradigmatic frequency in successful verb inflection reproduction by agrammatic speakers.

Overall, similar to the variable pairings involving length (Tables 14A-14D), number pairings support that singularity and, to a lesser extent, daily usage frequency - but not paradigmatic frequency - have an important enhancing effect¹ in verb inflection reproduction. However, number pairings suggest that the use of stress per se on the inflection does not seem to increase (or decrease) successful reproduction. Consequently, those inflectional markings in simple verb forms involving singular and frequently-used inflections are likely to be spared in this repetition task.

Daily Usage Frequency

Daily usage frequency was crossed with stress and paradigmatic frequency (Tables 14H-14I) with the following results:

Daily Usage Frequency X Stress (Table 14H): Although the data are discontinuous in this table, some comparisons between the different categories are possible. Regarding stressed inflections, success rate for frequently used verb markings (45.5%) is higher than for infrequently used markings (20.6%). Consistent with the findings reported for the number pairings, stress, when interacting with daily usage frequency, was not involved in the successful reproduction of the inflectional endings since the highest performance rate for this variable pairing occurs in the unstressed, P+PR category (69.1%).

Daily Usage Frequency X Paradigmatic Frequency (Table 14I): Results indicate that an increasing paradigmatic frequency seems to have a different effect in the repetition of frequently and infrequently used inflections by agrammatic speakers. Correct reproduction of verb markings, albeit higher for frequently used inflections (57.5%-53.1%) than for infrequently used inflections (10.6%-29.6%), remains similar across paradigmatic

frequency categories for frequently used inflections but increases for infrequently used markings. Nevertheless, the higher (and similar) percentages for P+PR suggest that frequent daily usage may have a stronger effect on verb inflection repetition than paradigmatic frequency.

In short, consistent with the reported number pairings above, stress and paradigmatic frequency do not interact with daily usage frequency to enhance successful verb inflection reproduction. Rather, daily usage frequency, when interacting with these two variables, seems to emerge as the strongest factor involved in the sparing of verb inflectional markings in Spanish.

Stress

Finally, the interaction between stress and paradigmatic frequency (Table 14J) was assessed:

Stress X Paradigmatic Frequency (Table 14J): Findings support the above trends observed for both unstressed inflections and paradigmatic frequency in verb inflection repetition by Spanish agrammatics since performance rate was higher for unstressed inflections (88.8%-67.8%) than for stressed inflections (25.5%-31.0%) across all paradigmatic frequency instances.

Summary

In sum, three variables primarily emerged as crucial factors in successful verb inflection repetition by agrammatic Spanish-speaking subjects in this second analysis: syllabic length, number, and daily usage frequency. Stress, although having a facilitating effect when its unstressed option was paired with number, daily usage frequency, and

paradigmatic frequency (Tables 14F, 14H, and 14J), did not fare equally well when paired with length. Stress or its lack did not have any differential effect in inflection repetition in the Length X Stress interaction (Table 14C). Finally, paradigmatic frequency, unlike in the first analysis, did not play a significant role in this second analysis. Thus, short (one-syllable) and singular verb inflections corresponding to frequently used simple verb tenses are likely to be spared as compared to their long, plural, and infrequently used counterparts.

4. DISCUSSION

4.1 Summary of Results

This investigation studied the deployment of verb inflections by agrammatic Spanish speakers in a sentence repetition task. The variables predicted to have a critical role in simple and compound verb reproduction were: verb form structure, daily usage frequency, theme vowel frequency, paradigmatic frequency, stress, syllabic length, and number. Analysis of each variable in isolation, considering the responses to both simple verb and compound verb stimuli as a group, suggested that the frequency of the verb's conjugation class does not play a crucial role in verb inflection repetition. Verb forms will likely be repeated correctly by Spanish agrammatic speakers when they are

- simple forms rather than compound forms,
- past participles rather than the Aux+PP form in compound verb tenses, and

they involve inflections that are

- frequent in both paradigm and daily discourse,
- 1-syllable rather than 3⁺-syllables long,
- singular rather than plural, and
- unstressed.

Analysis of these variables in interaction for the combined responses to simple and compound verbs revealed a substantial degree of correlation. However, evaluation of variable interaction in the responses to simple verb forms showed that syllabic length, number, and daily usage frequency interact to increase successful verb inflection

repetition: short, singular verb inflections corresponding to frequently used simple verb tenses are likely to be successfully repeated by Spanish-speaking agrammatic subjects. Stress, when present in its unstressed option, played a secondary role, and paradigmatic frequency, in contrast to its robust role in the first analysis, did not show any significance in the second analysis.

This chapter will address the importance of the above results in four sections. First, I will start with a discussion of the factors that might have played a crucial role in the above findings and their relevance to earlier descriptions of agrammatic verb impairment. Then, I will address the contribution that these findings might make to current psycholinguistic models of verb processing, and continue with a section on the importance of this study to clinical intervention of agrammatic verb errors. I will finalize this chapter with a conclusion including possible directions for future investigations of agrammatic verb impairment.

4.2 Facilitating Factors in Verb Repetition By Agrammatic Speakers

4.2.1 Morphological Structure of the Verb Phrase and Nominalization of Verb Forms

This study showed that agrammatic verb repetition is more likely to involve simple verb forms rather than complex forms (Table 5) and, in the particular case of Aux+PP compound forms, PP is the most frequently produced correctly (Table 6A-6F). These findings confirm earlier evidence showing that agrammatic speakers of other richly inflected languages, such as French and Italian, reduce verb complexity by omitting auxiliaries, favoring the repetition of the past participle in compound forms, and, in some

cases, relying on simpler non-finite, infinitival verb constructions in connected discourse (Miceli and Caramazza, 1988; Nespoulous et al., 1990; Miceli and Mazzucchi, 1990).

Two variables can be invoked to account for the increased repetition of simple forms relative to compound forms and PP relative to Aux by the agrammatic subjects in this study - the morphological structure of the verb phrase and the nominalization of verb forms.

Regarding morphological structure, these observations are consistent with earlier arguments on agrammatic word repetition conforming to a simplified utterance in the direction of the word's canonical form (Libben, 1990). It is possible to think that the agrammatic subjects in this study favored the production of simple tenses, rather than complex tenses, since they more closely resemble the infinitive form or simplest representation of a verb. In addition, the observed reduction of the verb phrase toward forms with a simpler morphological structure is also supported by the repetition contrasts in inflections of different syllabic length. In line with reports on an agrammatic tendency to favor the repetition of verb inflections with a short syllabic length (Miceli and Caramazza, 1988; Stark and Stark, 1990), results in this investigation showed that agrammatic subjects were more likely to repeat inflections that were 1-syllable long rather than 3-syllables long. Indeed, a preferred repetition of simple morphological forms is consonant with proposals supporting a reduction of effort during speech production in aphasic patients and speaking in general. For instance, the "economy of effort" explanation for non-fluent aphasia suggests that an aphasic might reduce his/her output to the barest information-carrying elements of his/her message (Gleason et al., 1975). Also, in the

process of speech production, in general, there is a trend towards “possible and favored” speech sounds and phonetic sequences to facilitate “motor economy” (Lindblom, 1983, p.220).

It is important to add that the above length findings may relate to morphological complexity. Jarema (personal communication, April 25, 1996) reported that length might be confounded by morphological complexity, a phenomenon that can be better examined if, instead of using a traditional conjugation-based approach to verb structural analysis, a different taxonomy is employed in which the verb would be broken down into its different morphemes, including the theme vowel, allowing a closer look at the different morphological components represented in the repeated verb inflections.

In terms of nominalization of verbs, the preference for PP in the responses to compound verb stimuli supports the use of nominalized verb forms in agrammatism (Goodglass and Geschwind, 1976; Saffran et al, 1980; Lorch, 1990). PP’s communicative significance to convey the verb’s meaning seems to be crucial. It is plausible to argue that PP, carrying the main meaning of the “action” expressed by the verb, was the obvious option (between Aux and PP) for the subjects to label the “event” taking place. Aux, in contrast, rather than expressing information on the verb’s meaning, encodes details on those nuances specifying the context of the verb’s action (i.e., mood, person-number, and tense-aspect).

A similar increase in the use of PP by agrammatic speakers was reported by Jarema and Nespoulous (1984). Their French-speaking agrammatics sometimes substituted the infinitive and/or the past participle for other verb forms. In the case of *-er*

type verbs, which correspond to the first conjugation class that is the most common verb group in French, the infinitive and the past participle are homophonous forms. Jarema and Nespoulous point out that previous reports that the infinitive dominates French-speaking agrammatics' verb production are thus problematic because agrammatic patients may have been producing PP forms instead. The results reported in this dissertation revealed that in Spanish, in which the infinitive and past participle are not homophonous (e.g., “*comer*”/to eat, “*comido*”/eaten) for any of the conjugation classes, PP use is increased in agrammatics.

In sum, successful verb repetition by agrammatic Spanish speakers seems to involve forms with a simple morphological structure and, in the case of compound verb combinations, the component capable of labeling the action of the verb and, in turn, being nominalized.

4.2.2 Frequency of Occurrence

Findings showed that singular verb inflections corresponding to frequently used verb tenses, namely, P and PR, were more likely to be repeated correctly than their plural and infrequently used counterparts. The robust repetition of P and PR inflections and singular markings confirms earlier arguments supporting the resistance of high-frequency words to aphasic dissolution (Howes, 1964; Rochford and Williams, 1965). Recall that P and PR, and singular inflections, which can be associated with an “automatic, routinized, and overlearned” nature (Schnitzer, 1989, p. 6) in light of their early acquisition by Spanish-speaking children (Gonzalez, 1980; Kvaal et al., 1988), are the most frequently

used inflections in adult Spanish narratives (Silva-Corvalán, 1983; Sebastián and Slobin, 1994; Bybee, 1985).

In psycholinguistic terms, as addressed previously (section 1.4.2), these forms are associated with a high lexical strength which makes them less vulnerable to phonological and inflectional errors than low-frequency forms (Stemberger, 1986) and can be processed as whole, autonomous items because of their high degree of morphological fusion (Bybee, 1985; 1995). For instance, a frequent verb form in Spanish, such as the preterite (PR) “*Bebió*” [s/he drank], is lexically stronger than an infrequent form, such as the imperfect (PRI) “*Bebíamos*” [we were drinking], due to their different degrees of morphological fusion, as predicted by Bybee’s conceptualization. “*Bebió*”, the frequent form, is associated with a high degree of fusion since it has no clear segmental markers for aspect separate from agreement markers (i.e., person and number). The final “-ió” signals preterite, indicative, and third person singular. In contrast, “*Bebíamos*”, an infrequent form (and, in turn, less lexically strong than “*Bebió*”), has less morphological fusion since it can be segmented into its imperfect marker, “-ía-” (for the *-er* conjugation class), and person-number agreement, “-mos” (first person plural) (Bybee, 1985).

Findings did not support a significant role of conjugation class or, as supported by the second data analysis, paradigmatic frequency in verb inflection repetition. This performance can be explained by the close morphological resemblance in the inflection paradigms for both second (*-er*) and third (*-ir*) conjugation classes. As noted by Schnitzer (1993) and illustrated in Appendix A, inflections for *-er* and *-ir* verbs largely neutralize in Spanish since they differ from each other in very minor ways and are not distinguished at

all in the preterite (PR) and imperfect (PRI). This overlap probably made *-er* and *-ir* inflections in the paradigm redundant thus enhancing their access and, as supported by the slight margin in our findings (Table 8), more favored than *-ar* terminations in repetition. Recall that the order in the percentages of correct responses in the data show that *-er* and *-ir* inflections were marginally repeated correctly more frequently than *-ar* inflections.

Two other features than can be implicated in this explanation are token frequency in *-er* and *-ir* verbs and the type frequency of *-ar* verbs. As noted earlier, Bybee (1995) suggested that the second (*-er*) and third (*-ir*) conjugation classes in Spanish have a high token frequency which makes them more autonomous, and more morphologically fused than the first (*-ar*) class. As a result, it is plausible to argue that second and third class verbs are less vulnerable to impairment than first class verbs. In addition, the *-ar* class, with the largest number of types and a lower token frequency, is involved in productivity, instead. Its affixes, associated with open schemas, can participate in the formation of new words, which explains the substitutions of *-ar* inflections for the obligatory *-er* and *-ir* markings by children and adults given nonsense verbs to inflect (Kernan and Blount, 1966; Schnitzer, 1993).

On the whole, adult usage frequency patterns for both verb tense and number markings, observed early in language development, seem to be important in the repetition of verb forms by agrammatic Spanish speakers. Frequent inflectional terminations resist linguistic impairment since they have been argued to involve a high lexical strength and morphological fusion.

4.2.3 Stress Patterns

Results showed that stress, specifically, in its “unstressed” option, was able to have an impact on successful verb repetition. However, this effect was not as crucial in facilitating verb inflection imitation as syllabic length, number, and daily usage frequency since it did not occur for all the variable pairings.

The observed trend for the favored repetition of unstressed inflections relative to stressed inflections can be accounted for by invoking two stress assignment features acting at the suprasegmental and segmental levels in Spanish. First, Qüilis and Fernández (1985) and Castelli and Mosonyi (1986) describe prosody patterns in declarative sentences in Spanish as having a descending intonation after an initial stress in the sentence (i.e., *cadencia*). In particular, Qüilis and Fernández add that this pattern is characteristic of word strings containing fewer than 8 words. Second, as mentioned earlier (section 1.1.2), Spanish has a basic Strong-Weak syllable pattern (H. S. Cairns, personal communication, March 5, 1996) with verbs, except for the infinitive and some forms of the preterite and the future, being always stressed on the penultimate syllable (Harris, 1969; 1983).

These arguments imply that it is possible that the responses by the agrammatic subjects conformed to the strong-weak stress pattern characterizing both prosody and syllable intonation contours in Spanish. Indeed, agrammatic speakers favored the production of this redundant stressed-unstressed intonational contour in their short responses in which the verb stem was part of the stressed portion of the contour and the inflection was in the unstressed, descending part of the contour.

Findings reported in this dissertation do not support Goodglass' (1973) and Kean's (1979) proposals on stressed linguistic forms being more likely to be retained in agrammatism than unstressed forms. However, in line with Gleason et al. (1975), it is plausible to argue that the above stressed-unstressed pattern is a reflection of the use of stress by the agrammatic speakers as an adaptive or compensatory strategy for their utterance initiation.

In brief, results in this study support that agrammatic verb repetition by Spanish speakers is consistent with the basic stress assignment properties of the language. Verbs correctly imitated by agrammatic Spanish speakers follow the characteristic Strong-Weak stress pattern found at both syllable and short-sentence levels in Spanish. However, these findings must be considered with caution since stress may be secondary to syllabic length, number, and daily usage frequency.

The above evidence supports that morphological structure, nominalization, frequency of occurrence, and, to some extent, stress and paradigmatic frequency can operate on the Spanish verb phrase to enhance the production of those verb forms that are structurally simple, can name the verb's action, appear frequently in discourse, and conform to the basic stress pattern of the language. These research findings are consistent with the verb production profiles in the oral narratives of Spanish-speaking agrammatic subjects. Agrammatic samples collected prior to this study, and discussed earlier in this dissertation (section 1.2), revealed that all of the 28 inflected verbs spontaneously produced by three agrammatic speakers consisted of simple forms primarily involving frequently used, unstressed, 1-syllable, and singular inflections belonging to the first

conjugation class (-ar) and occurring twice in the paradigm (Appendix F). Similar parallel profiles between empirical evidence and oral texts have been obtained by other investigators comparing the performance of agrammatic English-speaking subjects for the same structures in free narratives and structured oral production tasks (Caramazza and Hillis, 1989; Goodglass, Christiansen, and Gallagher, 1993).

Findings in this investigation are consistent with earlier reports on agrammatic verb impairment being associated with a reduction in verb phrase complexity in favor of morphologically simpler verb forms (Goodglass and Geschwind, 1976; Nespoulous et al., 1990; Miceli and Mazzucchi, 1990) and nominalized verbs (Goodglass and Geschwind, 1976; Saffran et al., 1980; Lorch, 1990), and the use of stressed linguistic units as a facilitating production strategy in agrammatism (Gleason et al., 1975). However, the evidence provided by this study goes beyond earlier descriptions of agrammatic verb production along the lines of additional variables, namely, syllabic length, frequency of occurrence, stress patterns of the language, and nominalization. Agrammatic subjects in this study significantly favored the repetition of those verbs with inflectional endings involving a simple morphological structure, consisting of one syllable as compared to three syllables, and the characteristic Strong-Weak stress pattern of Spanish, and corresponding to singular P and PR markings, the most frequently used number and tense inflections in Spanish discourse. In addition, in the particular case of compound verb combinations, the component with the higher capacity to name the action of the verb was employed.

Next, I will address the relevance of these findings to theoretical constructs on verb processing.

4.3 Implications For Psycholinguistic Models of Verb Processing

Several authors have implicated stages in Garrett's (1975, 1980) sentence production model to explain verb errors by agrammatic speakers. In particular, researchers placed the loci of the deficit in between the functional and the positional stages (Lapointe, 1985) or in the functional stage (De Bleser and Luzzatti, 1994) hence ultimately associating the deficit with limitations in the processing of morphological markers (see section 1.3 for a more detailed description on Garrett's sentence production model). However, the different stages proposed by Garrett and their processing mechanisms are left mostly unspecified (see Caramazza and Hillis [1989] for a discussion on this issue).

Other investigations have invoked lexicalist approaches to account for the mental operations involved in verb inflectional marking by agrammatic subjects. Recall that Jarema and Kehayia (1992) provided strong evidence in favor of a highly specified lexical storage for verbs, reflecting the verb's idiosyncratic morphological structure. Specifically, Jarema and Kehayia's findings on agrammatic error patterns for one-root and two-root verbs in French led them to argue for the possible storage of verbs in the form of a root and its specific affix possibilities. One-root verbs would only have one stem and its affixes whereas two-root verbs would have two separate, yet linked, stems with their specific affixes. In this manner, any affix misselection, as supported by the authors findings, would only involve the specific affixes associated with each root and not with another.

Our results, based on the incidence of correct repetition of verb inflectional markings and not on their error patterns, support the incorporation of additional language factors, namely, language acquisitional and use patterns, in psycholinguistic explanations

of verb processing. Our agrammatic Spanish-speaking subjects largely tended to favor the correct imitation of verb tenses and inflectional number markings associated with an early acquisition and frequent usage.

Schnitzer's (1989) assertion on early-acquired language forms and Bybee's (1985, 1995) and Stemberger's (1986) frequency-based theoretical accounts have an explanatory value for the mental operations of verbs. It is plausible to argue that verb forms acquired early and frequently used in conversation involve a high lexical strength (and less vulnerability to error) relative to those forms acquired later and used less frequently in discourse. In particular, Bybee's account, employing more specific linguistic operations than those of Schnitzer and Stemberger, argues that high-token-frequency units, with a high incidence of occurrence in daily language, would be more autonomous, more morphologically fused, and easier to access than low-token-frequency units. In short, Bybee's argument supports a functionalist conception of the lexicon as a store of morphological structures highly affected by actual language acquisitional and usage patterns.

4.4 Relevance to Agrammatism Therapy

The above findings suggest that agrammatic repetition of Spanish verb inflections appears to be in the direction of morphologically and semantically simple inflectional markings corresponding to verb forms frequently used in daily discourse. These observations argue for an incorporation of these variables in the clinical facilitation of verb production.

Our results suggest that agrammatic Spanish speakers showing difficulty with verb inflectional endings might benefit from a hierarchically organized clinical intervention plan sequencing the verbs to be addressed in therapy in a simple-to-complex fashion. This simple-to-complex hierarchy would start with verbs involving inflections that are singular, short (one-syllable), unstressed, and frequently used followed by verbs more complex along these lines. For example, forms such as “(el/ella) *come*” [he/she eats] and “(yo) *abro*” [I open] could be employed. In addition, some of the selection criteria used for the verbs in this study - high daily usage frequency (e.g., *tomar*/to drink, *comer*/to eat, *abrir*/to open, etc.) - might also be valuable to bear in mind as the clinician creates facilitating contexts for verb reproduction.

4.5 Significance to Future Research on Agrammatic Verb Errors

This study has provided an initial descriptive effort to specify the variables that might have an impact on the processing of verb inflections by Spanish-speaking agrammatics. In particular, our findings speak to the issue of the possible interactive mechanisms that might occur among the verb’s morphological structure, stress, and language use patterns to facilitate its access and retrieval. In addition, our findings add support to the explanatory significance that psycholinguistic models of verb processing based on actual language use might have in describing agrammatic profiles of verb use.

The descriptive and specifying nature of this study makes this research effort worth perfecting and pursuing in further studies of agrammatic verb errors. Also, the paucity in the aphasia literature of investigations studying verb inflectional assignment in agrammatism warrants further in-depth research. Several directions of research can be

followed. On the one hand, a systematic investigation looking at the facilitating role that the above variables might have in the clinical remediation of agrammatic verb deficits should be pursued. On the other hand, the analysis of the error patterns for the different variables studied here could also add valuable information on the enhancing factors operating in agrammatic verb use.

Appendixes

Appendix A: Examples of Verb Conjugations¹³

INDICATIVE MOOD

SIMPLE TENSES

			-AR (Tomar/to drink)		-ER (Comer/to eat)		-IR (Subir/to move up)
PRESENTE ¹⁴ (P)	Yo/I	TOM	o	COM	o	SUB	o
	Tú/You		as		es		es
	El/He		a		e		e
	Ella/She						
	Nosotros/We		amos		emos		imos
	Ustedes/You		an		en		en
	Ellos/They		an		en		en

Example: Yo tomo agua todos los días
I drink water everyday

PRETÉRITO PERFECTO SIMPLE (PR)	Yo/I	TOM	é	COM	í	SUB	í
	Tú/You		aste		iste		iste
	El/He		ó		ió		ió
	Ella/She						
	Nos./We		amos		imos		imos
	Ustedes/You		aron		ieron		ieron
	Ellos/They		aron		ieron		ieron

Example: Yo tomé mucha agua ayer
I drank a lot of water yesterday

PRETÉRITO IMPERFECTO (PRI)	Yo/I	TOM	aba	COM	ía	SUB	ía
	Tú/You		abas		ías		ías
	El/He		aba		ía		ía
	Ella/She						
	Nos./We		ábamos		íamos		íamos
	Ustedes/You		aban		ían		ían
	Ellos/They		aban		ían		ían

Example: Yo tomaba agua cuando ella llegó
I was drinking water when she arrived

¹³ The verb conjugations provided are only for those tenses included in this investigation.

¹⁴ Tenses have been labeled using the terminology of the Real Academia Española (1985), RAE.

Appendix A: Examples of Verb Conjugations (Continuation)

CONDICIONAL (C)	Yo/I	TOM	aría	COM	ería	SUB	iría
	Tú/You		arías		erías		irías
	El/He		aría		ería		iría
	Ella/She						
	Nos./We		aríamos		eríamos		iríamos
	Ustedes/You		arían		erían		irían
	Ellos/They		arían		erían		irían

Example: Yo tomaría agua si estuviera fría
I would drink water if it were cold

COMPOUND TENSES

			-AR (Tomar/To drink) tomado	-ER (Comer/To eat) comido	-IR (Subir/To move up) subido
PRETÉRITO PERFECTO COMPUESTO (PRP)	Yo/I	he			
	Tú/You	has	“	“	“
	El/He	ha	“	“	“
	Ella/She				
	Nos./We	hemos	“	“	“
	Ustedes/You	han	“	“	“
	Ellos/They	han	“	“	“

Example: Yo he tomado mucha agua hoy
I have drunk a lot of water today

			tomado	comido	subido
PRETÉRITO PLUSCUAMPERFECTO (PRC)	Yo/I	había			
	Tú/You	habías	“	“	“
	El/He	había	“	“	“
	Ella/She				
	Nosotros/We	habíamos	“	“	“
	Ustedes/You	habían	“	“	“
	Ellos/They	habían	“	“	“

Example: Yo había tomado agua antes que ella llegara
I had drunk water before she arrived

Appendix B: Verb Paradigm for the Tense-Aspect Forms Used in Daily Discourse

(A) SIMPLE TENSES

			-AR (Tomar/to drink)		-ER (Comer/to eat)		-IR (Subir/to move up)
P¹⁵	Yo/I	TOM	o (1)	COM	o (25)	SUB	o (49)
	Tú/You		as (2)		es (26)		es (50)
	El/He		a (3)		e (27)		e (51)
	Ella/She						
	Nosotros/We		amos (4)		emos (28)		imos (52)
	Ustedes/You		an (5)		en (29)		en (53)
	Ellos/They		an (6)		en (30)		en (54)
PR	Yo/I	TOM	é (7)	COM	í (31)	SUB	í (55)
	Tú/You		aste (8)		iste (32)		iste (56)
	El/He		ó (9)		ió (33)		ió (57)
	Ella/She						
	Nos./We		amos (10)		imos (34)		imos (58)
	Ustedes/You		aron (11)		ieron (35)		ieron (59)
	Ellos/They		aron (12)		ieron (36)		ieron (60)
PRI	Yo/I	TOM	aba (13)	COM	ía (37)	SUB	ía (61)
	Tú/You		abas (14)		ías (38)		ías (62)
	El/He		aba (15)		ía (39)		ía (63)
	Ella/She						
	Nos./We		ábamos (16)		íamos (40)		íamos (64)
	Ustedes/You		aban (17)		ían (41)		ían (65)
	Ellos/They		aban (18)		ían (42)		ían (66)
C	Yo/I	TOM	aría (19)	COM	ería (43)	SUB	iría (67)
	Tú/You		arías (20)		erías (44)		irías (68)
	El/He		aría (21)		ería (45)		iría (69)
	Ella/She						
	Nos./We		aríamos(22)		eríamos(46)		iríamos(70)
	Ustedes/You		arian (23)		erían (47)		irían (71)
	Ellos/They		arian (24)		erían (48)		irían (72)

¹⁵ Refer to Appendix A for abbreviations (i.e., P, PR, PRI, etc.)

Appendix B: Verb Paradigm for the Tense-Aspect Forms Used in Daily Discourse
 (Continuation)

(B) COMPOUND TENSES

Tense			-AR (Tomar/To drink)	-ER (Comer/To eat)	-IR (Subir/To move up)
PRP	Yo/I	he	tomado	comido	subido
	Tú/You	has	“	“	“
	El/He	ha	“	“	“
	Ella/She				
	Nos./We	hemos	“	“	“
	Ustedes/You	han	“	“	“
	Ellos/They	han	“	“	“
PRC	Yo/I	habia	tomado	comido	subido
	Tú/You	habias	“	“	“
	El/He	habia	“	“	“
	Ella/She				
	Nos./We	habiamos	“	“	“
	Ustedes/You	habian	“	“	“
	Ellos/They	habian	“	“	“

Appendix C: Frequency Count Of Verb Tenses Used in Venezuelan Newspaper Texts and Soap Operas

Tense-Aspect	Newspaper	Soap Opera	Total (%)
PRESENTE	19.2 (95/495)	34.3 (170/495)	53.5 (265/495)
PRETERITO PERFECTO SIMPLE	12.9 (64/495)	12.5 (62/495)	25.5 (126/495)
PRETERITO IMPERFECTO	1.6 (08/495)	3.2 (16/495)	4.8 (24/495)
PRETERITO PERFECTO COMPUESTO	2.2 (11/495)	2.2 (11/495)	4.4 (22/495)
CONDICIONAL	0.8 (04/495)	2.4 (12/495)	3.2 (16/495)
PRETERITO PLUSCUAMPERFECTO	0.2 (01/495)	1.4 (07/495)	1.6 (08/495)
FUTURO			6.5 (32/495)
Periphrastic Form	28.1 (09/32)	53.1 (17/32)	81.2 (26/32)
Inflected Form	12.5 (04/32)	6.2 (02/32)	18.8 (06/32)
CONDICIONAL PERFECTO	0.2 (01/495)	0.2 (01/495)	0.4 (02/495)

Frequency count expressed in percentages (%) for the verb tenses in the indicative mood used in the narrative of Venezuelan newspaper articles and soap operas.

APPENDIX D: Questionnaire

1. Date _____
 2. Name _____
 3. Date of Birth _____ Age _____
 4. Birth Place _____
 5. Gender _____
 6. How many years of school did you complete? _____
 7. Occupation _____
-
8. Do you speak another language besides Spanish? Yes ___ No ___
 If answer is Yes, What language(s)? _____
 Do you use this/these language(s) at the present time? Yes ___ No ___
 9. How much time a week do you spend on the following activities?

	1- 3 hr.	4-6 hr.	6+ hr.
Reading newspaper/books	_____	_____	_____
Writing letters/work-related materials	_____	_____	_____
Speaking to an audience	_____	_____	_____
-
- (To be obtained from the medical staff)¹⁶
10. CVA onset _____
 11. Localization/How determined? _____

 12. Handedness Right _____ Left _____ Ambidextrous _____
 13. Hearing status _____
- Other Comments** (Use back of this form if necessary)

¹⁶ Adapted from Menn and Obler (1990)

APPENDIX E: Experimental Sentences

Tense ¹⁷		-AR	-ER	-IR
		Limpiar/To clean LIMP-	Coger/To take COG-	Partir/To break PART-
P	Yo	Limpio <i>la casa</i> ¹⁸	Cojo <i>mi plata</i>	Parto <i>la tiza</i>
	El/Ella	Limpia	Coge	Parte
	Nos.	Limpiamos	Cogemos	Partimos
	Ellos(as)	Limpian	Cogen	Parten
PR		Limpié <i>la sala ayer</i>	Cogí <i>frutas</i>	Partí <i>dos tazas</i>
		Limpió	Cogió	Partió
		Limpiamos	Cogimos	Partimos
		Limpieron	Cogieron	Partieron
PRI		Limpiaba <i>la mesa</i>	Cogía <i>la basura</i>	Partía <i>galletas</i>
		Limpiaba	Cogía	Partía
		Limpiábamos	Cogíamos	Partíamos
		Limpiaban	Cogían	Partían
C		Limpiaría <i>la cocina</i>	Cogería <i>mangos</i>	Partiría <i>madera</i>
		Limpiaría	Cogería	Partiría
		Limpiaríamos	Cogeríamos	Partiríamos
		Limpificarían	Cogerían	Partirían
PRP		He limpiado <i>los cuartos</i>	He cogido <i>los papeles</i>	He partido <i>los huesos</i>
		Ha limpiado	Ha cogido	Ha partido
		Hemos limpiado	Hemos cogido	Hemos partido
		Han limpiado	Han cogido	Han partido
PRC		Había limpiado <i>la casa</i>	Había cogido <i>café</i>	Había partido <i>galletas</i>
		Había limpiado	Había cogido	Había partido
		Habíamos limpiado	Habíamos cogido	Habíamos partido
		Habían limpiado	Habían cogido	Habían partido
		-AR	-ER	-IR
		Tomar/To drink TOM-	Comer/To eat COM-	Subir/To move up SUB-
P	Yo	Tomo <i>más café</i>	Como <i>poca sal</i>	Subo <i>las sillas</i>
	El/ella	Toma	Come	Sube
	Nos.	Tomamos	Comemos	Subimos
	Ellos(as)	Toman	Comen	Suben
PR		Tomé <i>cerveza ayer</i>	Comí <i>torta</i>	Subí <i>la mano</i>
		Tomó	Comió	Subió
		Tomamos	Comimos	Subimos
		Tomaron	Comieron	Subieron

¹⁷ Refer to Appendix A for abbreviations (i.e., P, PR, PRI, etc.)

¹⁸ The verb's direct object, being the same for all the persons in a tense-aspect category of a conjugation class, is only indicated for the first person singular.

APPENDIX E: Experimental Sentences (Continuation)

PRI		Tomaba <i>mucho vino</i> Tomaba Tomábamos Tomaban	Comía <i>la cena</i> Comía Comíamos Comían	Subía <i>los muebles</i> Subía Subíamos Subían
C		Tomaría <i>leche</i> Tomaría Tomaríamos Tomarían	Comería <i>papas</i> Comería Comeríamos Comerían	Subiría <i>la caja</i> Subiría Subiríamos Subirían
PRP		He tomado <i>mucha agua</i> Ha tomado Hemos tomado Han tomado	He comido <i>pollo</i> Ha comido Hemos comido Han comido	He subido <i>dos camas</i> Ha subido Hemos subido Han subido
PRC		Había tomado <i>café</i> Había tomado Habíamos tomado Habían tomado	Había comido <i>mucho pan</i> Había comido Habíamos comido Habían comido	Había subido <i>las matas</i> Había subido Habíamos subido Habían subido
		-AR Cortar/to cut CORT-	-ER Vender/to sell VEND-	-IR Abrir/to open ABR-
P	Yo El/ella Nos. Ellos(as)	Corto <i>los panes</i> Corta Cortamos Cortan	Vendo <i>ropa</i> Vende Vendemos Venden	Abro <i>los regalos</i> Abre Abrimos Abren
PR		Corté <i>la tela ayer</i> Cortó Cortamos Cortaron	Vendí <i>las sillas</i> Vendió Vendimos Vendieron	Abrí <i>la tienda</i> Abrió Abrimos Abrieron
PRI		Cortaba <i>mucha carne</i> Cortaba Cortábamos Cortaban	Vendía <i>trajes</i> Vendía Vendíamos Vendían	Abría <i>las cajas</i> Abría Abríamos Abrían
C		Cortaría <i>la torta</i> Cortaría Cortaríamos Cortarían	Vendería <i>los muebles</i> Vendería Venderíamos Venderían	Abriría <i>la ventana</i> Abriría Abriríamos Abrirían
PRP		He cortado <i>las frutas</i> Ha cortado Hemos cortado Han cortado	He vendido <i>flores</i> Ha vendido Hemos vendido Han vendido	He abierto <i>la puerta</i> Ha abierto Hemos abierto Han abierto

APPENDIX E: Experimental Sentences (Continuation)**PRC**

Había cortado *más queso*
Había cortado
Habíamos cortado
Habían cortado

Había vendido *dos carros*
Había vendido
Habíamos vendido
Habían vendido

Había abierto *la tienda*
Había abierto
Habíamos abierto
Habían abierto

Appendix F: Verb Inflections by Spanish-Speaking Agrammatic Subjects in Free Oral Narratives

Variable	Percentage of Occurrence (%)	
Daily Frequency	Present	92.8 (26/28)
	Imperfect	7.1 (02/28)
Stress	Unstressed	92.8 (26/28)
	Stressed	7.1 (02/28)
Syllabic Length	1-Syllable	71.4 (20/28)
	2-Syllable	28.5 (08/28)
Number	Singular	85.7 (24/28)
	Plural	14.2 (04/28)
Conjugation Class	-ar	53.5 (15/28)
	-er	32.1 (09/28)
	-ir	14.2 (04/28)
Paradigmatic Frequency	1X	32.1 (09/28)
	2X	46.4 (13/28)
	3+X	21.4 (06/28)

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