The Effects of Processing Instruction on the Acquisition of Ser and Estar

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Abstract: Extending previous research on the acquisition of Spanish clitic pronouns (elements with high communicative value), this study compares the relative effects of two types of instruction, processing instruction and traditional instruction, on the acquisition of the verbs ser and estar with adjectives and past participles. The dual roles of these verbs as semantic and aspectual indicators in combination with their low communicative value for comprehension make the subtle distinction complicated for English-speaking learners in the early stages of acquiring a second language. However, when only the estar (marked copula) data is analyzed, the results of this classroom-based research with second-year college students of Spanish partially corroborate earlier findings by VanPatten and his fellow researchers: The performance of students who received traditional instruction improved only on sentence production and guided composition tests, while that of the processing-instruction group improved on both interpretation and production tests.

Key words: communicative value, form-focused instruction, grammar instruction, input processing, intake, output, processing instruction, copula, second-language acquisition

1.0 Introduction

Research in the last three decades on formal instruction in second-language acquisition has tended to focus on four questions: Does formal instruction make a difference in second language acquisition? Does the type of instruction make a difference? Is teaching grammar beneficial to second language acquisition? And, finally, what should be taught and when? (Doughty and Williams 1998; Ellis 1990; Norris and Ortega 2000). Within the classroom context, recent studies have shown growing interest in a focus on form and meaning. One of the central concerns to researchers of form-meaning processing is how and which types of pedagogical efforts affect the processes of second language acquisition (SLA). In the area of explicit grammar instruction, the study by VanPatten and Cadierno (1993) specifically addressed input processing in relation to second language acquisition theory and classroom instruction. The authors examined the comparative effects of two types of explicit grammar instruction: (1) processing instruction group, which provides explicit grammar explanation about correct processing strategies, followed by structured input-oriented practice; (2) traditional instruction group, which focuses on grammar explanation followed by output-oriented practice. They found that processing instruction produced superior effects. This study extends this line of research to examine the effectiveness of processing instruction on different forms.

2.0 Processing Instruction and other studies

Processing instruction, based on an SLA model (cf. VanPatten 1993, 1996, 2000 for elaboration) targets the initial stage of second-language acquisition processes which consist of input processing, accommodation and restructuring, and output processing. In input processing, learners perceive the meaning-bearing input while mapping the meaning with its form, as well as assign syntactic categories to the words they comprehend, and then project the associated phrases...
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onto a sentence. Input processing converts the input to intake, linguistic data actually processed from the input and held in working memory for further processing. Input processing is concerned with how learners get form (e.g., functors, inflections) from input while their primary attention is on meaning during the act of comprehension.

In a foreign/second language (L2) classroom, the traditional approach to learning grammar is production oriented: after the rules are explained, the instructor guides students to produce the grammatical form practiced, progressing from controlled mechanical drills, to meaningful practices, and to open-ended communicative practices. This process of retrieving acquired knowledge to produce words or sentences involves output processing. VanPatten and Cadierno (1993) argue that traditional grammar instruction does not reflect how students learn or process input. These authors hold that the type of instruction that enables students to "process" information via comprehensible and structured input activities, processing instruction, is more effective than traditional instruction that requires learners to produce language prematurely. In their study on teaching Spanish direct object pronouns, they compared three groups of learners who received traditional instruction (TI), processing instruction (PI) and a control group (no instruction on the target form). The PI group outperformed the TI group on an interpretation task, performed as well as the TI group on a sentence production task, and the effects of instruction remained one month later. Replication studies on the effects of processing instruction on mainly morphosyntactic forms and using different assessment tasks generally corroborated VanPatten and Cadierno's findings (e.g., Benati 2001 [Italian future tense]; Cadierno 1995 [Spanish preterit]; VanPatten and Oikennon 1996 [Spanish object pronouns/word order]; VanPatten and Sanz 1996 [Spanish object pronouns/word order]).

Other studies have produced conflicting results but have deviated from the original study in their instructional treatments or assessment instruments; they cannot be interpreted as counter evidence (e.g., DeKeyser and Sokalski 1996, Salaberry 1996 [Spanish object pronouns]; Collentine 1998, Farley 2001 [Spanish subjunctive]; DeKeyser and Sokalski 1996 [Spanish conditional verb endings]; Nagata 1998 a and b [Japanese nominal pronouns]; and Allen 2000 [French causative]). The conflicting results could be partially explained as deriving from theoretical and methodological problems: (1) different research designs from the original study when comparing input comprehension vs. output production instructions, (2) lack of theoretical or empirical support of the processing strategies of target form or structure, (3) inadequate design of the claimed processing instruction, (4) alternation of assessment instruments, and (5) the difference between traditional instruction and output-based instruction that focused more on meaningful and communicative activities. (See Allen 2000, Farley 2001, Polio and Gass 1997, Sanz and VanPatten 1998, and VanPatten 2000 for additional discussion.)

3.0 Processing and Production Strategies for Ser and Estar

Ser and estar are connectors that carry little or no lexical meaning but do carry some semantic load. They share most structural environments and are acceptable with a large number of adjectives, though some adjectives can occur only with estar (e.g., contento) while others can occur only with ser (e.g., inteligente) under normal conditions. Generally, the uses of ser and estar with adjectives are based on dichotomies, e.g., permanent versus temporary, or essential and inherent versus accidental or circumstantial (Navas Ruiz 1963).

The usage of ser and estar does not depend only on syntactic or lexical constraints; extended discourse and shared knowledge among the speakers must be considered also. A basis for selecting either ser or estar could be the type of implied comparison that the sentence makes (Franco and Steinmetz 1983, 1986). Ser is used to classify the subject as one type among several: Maria es bonita states that her beauty is greater than that of the average girl. In contrast, estar is used when the subject is compared with itself under different conditions: Maria está bonita ahora, Maria’s appearance is prettier than usual. The choice between ser and estar in the [copula
+ adjective] construct is largely influenced by the meaning of the adjective and its contextual features such as physical states, frame of reference in time, and lexical class (Geeslin 2000). Syntactic aspects can also help distinguish between usages of the two forms, especially in constructs using past participles (Luján 1981).

The complexity of ser and estar poses significant problems for L2 learners. Even though these verbs are generally introduced early in most beginning-level Spanish textbooks and gain frequent use in the classroom, students do not acquire them as quickly nor as accurately as expected (Finnemann 1990; VanPatten 1985, 1987; Guntermann 1992; Ryan and Lafford 1992). The choice of ser and estar is difficult because learners first must acquire the distinctions between adjective types (e.g., inherent vs. accidental) and aspectual types (i.e., perfective vs. imperfective) before they can decide when to use ser and when to use estar.

Previous studies found transitional stages in the development of ser and estar similar to the way children acquire a first language: the beginning L2 learner omits copulas during the initial stages. Later, learners appear to use ser as the default structure. Estar does not appear until late in the first year of learning Spanish (Finnemann 1992; VanPatten 1985, 1987). In a classroom environment, the acquisition of estar with progressive structures (están comiendo) precedes the acquisition of locatives (está en casa), which, in turn, comes before the acquisition of other estar constructs (such as conditionals, estar + adjective = estoy contenta). In other environments, immersion or study abroad, research results differ slightly (Ryan and Lafford 1992; Guntermann 1992).

Omission of ser and estar in the earliest stage of acquisition can be explained by their lack of communicative value during input processing (Bransdorfer 1991). Because ser and estar are connectors carrying little or no lexical meaning for English learners, the choice of ser or estar is determined by the intended meaning of the adjective or sentence. In teaching ser and estar, the challenge is to make the learner perceive subtle distinctions between them in constructs where they share the same syntactic context. Since learners tend to generalize the use of ser early on, it is the acquisition of estar that is of interest. Thus, processing instruction in this study aims at altering beginning learners' strategy of using ser as a default copula.

4.0 Justification for this study

In previous processing instruction studies, the target forms have been primarily morphosyntactic and, consequently, carried a direct one-to-one mapping between meaning and form. Ser and estar, however, are multi-functional markers that can link subjects with nouns, adjectives, progressives, or past participles. Distinctions in meaning occur in some contexts with a certain subset of adjectives. It is unclear whether processing instruction on ser or estar, which do not have an obvious one-to-one form and meaning mapping, would have as great an impact on a learner’s developing system as would the explicit teaching of morphosyntactic forms.

Unlike morphosyntactic forms such as the direct object pronouns lo and la, Spanish ser and estar have little communicative value and may be ignored in input or omitted from speech or written texts without impeding communication for learners. Thus, beginning learners tend to over-generalize the use of ser to the context of estar constructs. Studies that have investigated forms with low communicative value (e.g., Collentine 1998; Farley 2001) have revealed that processing instruction effects are generalizable irrespective of traditional or meaning-based output instructions. No research has focused on the words that convey semantic-grammatical concepts. Perhaps a combination of word-level (for the form) and subtle meaning distinctions may yield different results. While processing instruction may be better than traditional instruction for various structures that involve formal features of words (i.e., inflections) and for word order at the sentence level, different linguistic forms are, perhaps, processed and stored differently. It remains to be empirically explored whether processing versus traditional instructional effects are obtained on other kinds of grammatical structures that convey semantic-grammatical concepts (e.g., ser vs. estar).
5.0 Methodology

The following research questions guided the design of this study:

1. Does type of instruction (processing instruction, traditional instruction and no instruction) differentially affect learners’ ability to:
   a. interpret sentence level messages containing ser and estar,
   b. produce sentence level messages with ser and estar,
   c. produce discourse level messages with ser and estar?
2. Will the effects of instruction, if any, be retained over time?

Participants were divided into three groups: (1) a TI group, (2) a PI group, and (3) a control group, which received no explicit instruction on ser and estar. To assess the effects of explicit grammar instruction, participants were tested on their knowledge of ser and estar using varied tests: one pre-test and two post-tests, each evaluating three types of tasks: sentence interpretation, sentence production, and guided composition.

5.1 Participants

The study involved all thirteen classes (197 college students) of a fourth-semester Spanish course in order to avoid the effects of self-selection and ensure random sampling. Normal distribution of participants was determined using a questionnaire given prior to the actual test. The 109 participants included in the data analysis completed all stages of the experiments (tests and instruction), learned English as their first language without frequent exposure to Spanish at home or with relatives, and had less linguistic knowledge of the target form based on the pre-test scores (less than 60%).

5.2 Instructional Materials

Separate instructional packets for the PI and TI groups were developed to reflect the two different teaching approaches focusing on the structure of ser and estar followed by adjectives and past participles.

TI involved explicit grammar explanation and exercises emphasizing production of the target forms. Materials given to students, derived from the intermediate Spanish textbook Pasajes, consisted of two sections: the first involved an explanation of the usage of ser and estar with an adjective, and the second involved an explanation of ser and estar followed by a past participle. In each section, the contrast between ser and estar was introduced as were activities providing opportunities to produce these forms immediately after the explanation by moving from typical controlled mechanical drills to meaningful and communicative open-ended questions.

Guidelines proposed by Lee and VanPatten (104-114) formed the basis for the instructional materials for PI. The explanation in the processing package deliberately directed the learner’s attention to functions of ser and estar, reminding them not to overlook ser and estar because these verbs might provide clues as to sentence meaning. Exercises with manipulated input pushed learners to get meaning from target forms rather than using their existing strategy of assigning ser as the default during the act of comprehension; learners had a better chance of attending to the target forms. Generally, the study used four types of referentially- and affectively-oriented activities in PI. Participants in the PI group were not required to produce target forms in any activities; they only participated in interpretation practices.

Despite the different formats used, the two instructional packages were balanced for the number of each ser and estar construct, vocabulary, and the number of practice and activity types. Care was taken to check items of each instructional package against the testing materials to avoid a teaching-testing bias.
5.3 Assessment Materials

Three types of tasks were developed to assess improvement due to instruction: an oral interpretation task at the sentence level, a sentence production task, and a guided composition. The interpretation task comprised two subtasks: matching a sentence with a picture and matching a sentence with a situation written in English. There were ten target test items, four with ser and six with estar.

In the sentence production task, each test item began with a statement in English setting up the context where the dialogue took place. After reading the dialogue in Spanish, students completed a sentence with four given options (adjectives or past participles). Of the ten test items, four required ser and six required estar.

The guided composition task asked students to describe several drawings that narrated a story. To control for the use of target structures in the student’s writing, key adjectives or past participles (five requiring ser and seven requiring estar) were provided beside each drawing, and students were instructed to use all the words given while writing their stories. Key words included targeted adjectives and other vocabulary helpful to talk about people, objects, and events.

5.4 Instructional and Data Collection Procedures

The participants’ normal classroom periods were used for all instructions and assessments, and all oral and written instructions were in English. The regular instructors were replaced by a third-party neutral, experienced instructor who was not the researcher.

To rule out possible effects of test item familiarity and test order, a split-block design was used in three versions of the tests. To ensure internal consistency and stability among the pre- and post-tests, three pilot studies on the test items were conducted for discriminability analysis and normality of data distribution. The pre-test was administered one week before the two consecutive days of instruction and post-test 1 was completed immediately after the second day of instruction. Post-test 2 was administered three weeks later, due to curriculum and scheduling constraints in the participants’ regular classes.

5.5 Scoring Procedures

The scoring included computation of raw scores for interpretation and sentence completion tasks and transformation scores for the composition. In the interpretation task, one point was assigned for each correct answer (zero points for incorrect); the highest possible total was ten. For the sentence production task, the response was scored correct (total 10) when verb use and selection of an adjective or a past participle were appropriate for the given context. Other mistakes in the sentence were disregarded.

Five native speakers of Spanish scored the compositions independently with two raters for each composition. Inter-rater reliability was 1.00. Instances of each use of ser and estar were scored by percentage of Target-Like Use (TLU) (Pica 1983). One point was given for each correct use of either ser or estar; zero points were given when no verb was supplied in contexts requiring one. Rather than raw scores, Arc-sine transformed scores were used for the descriptive statistics.

5.6 Data Analysis

Data were submitted to a Lindquist Type I 3 x 3 repeated measures Analysis of Variance (ANOVA). Type of instruction (processing vs. traditional vs. control) was entered as the between-subject variable while time (pretest vs. post-test 1 vs. post-test 2) was entered as the within-subject variable. Separate ANOVAs were conducted on data for the oral interpretation, sentence production, and composition tasks. When significant differences were found, a post hoc
multiple comparison procedure (Tukey HSD) was performed to establish the source of the difference.

In an effort to control for the variable of previous knowledge, scores higher than 60% were excluded according to results on each task in the pre-test as established by VanPatten and Sanz (1995).

6.0 Results

The ANOVA conducted on pre-test scores revealed no significant differences among the three groups before the instructional treatments. Therefore, it can be assumed that any differences among groups on the post-tests were due to the type of instruction received.

Table 1 presents the ANOVA summary for the interpretation task. Figures 1.1, 1.2 and 1.3 plot the interaction between instruction and time. The analysis revealed significant main effects for instruction and for time. The post hoc Tukey HSD tests showed that on post-test 1 the mean of the PI group (6.72) was significantly higher than that of the control group (5.42) \( (p < .01) \), whereas no significant difference was obtained in the other comparison pairs. On post-test 2, the mean of the TI group (5.47) was significantly higher than that of the control group (4.64) \( (p < .01) \). No significant difference was found in other comparison pairs.

With regard to delayed instructional effects (second research question), the ANOVA results indicated that for PI, significant differences existed between the pre- and post-test 1 \( (F = 63.83, p < .01) \), between pre- and post-test 2 \( (F = 6.09, p < .05) \) and between post-test 1 and post-test 2 \( (F = 21.85, p < .01) \). The significance implies that participants retained the knowledge learned from the instruction over time. The PI’s performance declined significantly on post-test 2, which explains the non-significant difference between the PI and control groups on post-test 2. The TI group revealed significant differences between the pre- and post-test 1 \( (F = 23.82, p = .00) \) and between pre- and post-test 2 \( (F = 8.75, p = .01) \), but no significant difference between post-test 1 and post-test 2. Significant difference between the pre- and post-test 1 \( (F = 17.09, p < .00) \) was found for the control group, but not between pre- and post-test 2. The control group’s progress in post-test 1 may result from test effects that raised their awareness of the copulas.

To summarize, in the interpretation task the PI group outperformed the control group on the immediate post-test while the TI group outperformed the control group on post-test 2. Thus, the TI group did unexpectedly better in the delayed interpretation task, even though the TI group had had no particular practice in interpretation. There was no significant difference between the PI and TI groups on either post-test. Instructional effects in both groups were retained over time.

Due to the significant interaction between instruction and time in the sentence production task (Table 1, Figure 1.2), an additional ANOVA was conducted to examine participants’ progress by subtracting each participant’s mean on pre-test from that on each post-test. The ANOVA results in progress from the pre-test to post-test 1 and post hoc pairwise comparison between the three groups indicated a significant difference between the PI and control groups \( (F = 6.13, p < .05) \). No significant difference was obtained between the TI and control groups, nor between the PI and TI groups. For the progress from pre- to post-test 2, the results of pairwise comparison revealed significant differences between the PI and control groups \( (F = 8.96, p < .01) \) and between the TI and control groups \( (F = 6.23, p < .05) \). No significant difference was obtained between the TI and PI groups.

Regarding retention of instructional effects, the ANOVA results for the PI group indicated a significant effect for time \( (F = 22.72, p < .01) \), caused by the differences between pre- and post-test 1, and between pre- and post-test 2. \( (F = 48.44, p < .01; F = 26.94, p < .01) \), respectively. For the TI group, there was also a significant difference for time \( (F = 21.32, p < .01) \), as shown by the differences between pre- and post-test 1 \( (F = 32.29, p < .01) \) and between pre- and post-test 2 \( (F = 33.52, p < .01) \). No significant difference was found between post-test 1 and post-test 2 for either the PI and TI groups. For the control group, the results revealed a significant difference between pre- and post-test 1 \( (F = 10.37, p < .00) \), but not between pre- and post-test 2.
Overall, in the sentence production task the TI group did not show immediate instructional effect but a delayed effect. The PI group outperformed the control group on both post-tests and also performed as well as the TI group even though the PI group did not practice producing the target forms during the instructional phases. Both instructional groups retained the knowledge gained and outperformed the control group three weeks later.

In the guided composition task (Table 1 and Figure 1.3), given the significant interaction between instruction and time, further ANOVAs examining the progress after instruction across the three groups and post hoc pairwise comparisons revealed significant differences for the progress from the pre- to post-test 1 between the PI and control groups ($F = 5.42, p < .05$), and between the TI and control groups ($F = 8.36, p < .01$). For progress from the pre- to post-test 2, the results indicated significant differences between the PI and control groups ($F = 7.69, p < .01$) and between the TI and control groups ($F = 6.73, p < .05$). No significant differences were found between the PI and TI groups in either post-test. For retention of instructional effects, the PI group results indicated a significant effect for time ($F = 12.15, p < .01$), as shown by significant differences between the pre- and post-test 1 and between the pre- and post-test 2 ($F = 19.64, p < .01; F = 27.79, p < .01$, respectively). There was no significant difference between post-test 1 and post-test 2. In the TI group, a significant difference for time ($F = 15.70, p < .01$) was shown by the differences between the pre- and post-test 1 and post-test 2 ($F = 31.44, p < .01$), and between the pre- and post-test 2 ($F = 21.22$). For the control group, no significant difference was found between the pre- and post-tests.

Overall, the PI and TI groups outperformed the control group in writing compositions involving both *ser* and *estar* + adjectives or past participles. The PI and TI groups retained the instructional effect over time.

Table 2 presents a summary of post-hoc test results on combined copula data by task and post-test. A significant difference between groups is noted by the > sign; a non-significant difference between groups is represented by the = sign.

Similar to findings of VanPatten and Cadierno's (1993) study for the production tasks, the results of this study of combined copula data show that the PI and TI groups performed equally well in the production post-tests. However, in contrast to the results of VanPatten and Cadierno's (1993) study, which found superior results for the PI group over the TI in all post-tests on the interpretation task, the PI group in the present study did not score significantly higher than the TI group on any interpretation post-tests. Part of the reason for the differing results may stem from the type of data studied. The present study might be complicated by the lack of communicative value of the copulas when compared to that of the clitics studied by VanPatten and Cadierno. Performance on test items with *ser* may possibly have masked effects for *estar*. However, since *estar* is more lexically substantive marked than *ser*, possibly the results of an analysis of just the copula *estar* will yield different results than for the combined copula data. Therefore, subsequent ANOVAs and post hoc comparisons on the verb *estar* only were conducted.

Table 2 summarizes the results of statistical analysis for sentence interpretation, production, and composition tasks for *estar* only. Figures 2.1, 2.2 and 2.3 represent the interaction plot between the three instructional groups and time for the sentences with *estar*.

With regard to the interpretation task (Table 1, Figure 2.1), the ANOVA performed on post-test 1 of the *estar* only data revealed similar results as reported above for the combined copula data: the PI group outperformed the control group, and the TI group showed no significant difference between the PI nor the control groups. On post-test 2, no group differed significantly from the others. Thus, when looking only at *estar* data on the interpretation task, PI is the only form of instruction showing superior results to the control group, whereas when the copula data are combined, both PI and TI produced superior effects to those of the control group, albeit in different post-tests.

Concerning retention of instructional effects, the PI group results indicated a significant effect for time, as evident in differences between the pre- and the two post-tests ($F = 29.73, p < .01, F = 9.76, p < .01$, respectively), suggesting that the PI group retained the knowledge learned
from the instructional treatment. Within each TI and control group, ANOVA results revealed the same pattern: a significant effect of time, as shown by differences between the pre- and two post-tests. It is unclear why the control group improved in interpretation; its gains were minimal though enough to be significantly different in the progress from the pre-scores (0.89 and 0.78 out of 6 in post-test 1 and post-test 2, respectively).

Overall, estar only data indicated the PI was more effective in helping participants interpret sentences than the control-group’s instruction, whereas TI was not significantly different from the control-group’s instruction. The initial effect of PI on the interpretation task with estar held over time.

ANOVA results for estar only in the sentence production task (Table 2, Figure 2.2) showed no significant main effect for instruction, but a significant main effect for time and a significant interaction between instruction and time. Additional ANOVA results for participants’ progress from the pre- to post-test 1 showed significant differences between the PI and control groups ($F = 4.53, p < .05$), and between TI and control groups ($F = 6.52, p < .05$). (This last comparison was not significant when copulas were combined.) There was no significant difference between the PI and TI groups. For progress from the pre- to post-test 2, results revealed a significant difference between the PI and control groups ($F = 6.38, p < .05$), but no significant difference was found between the TI and control groups (this was different [significant] for combined copula data) nor between the PI and TI groups.

For retention of instructional effects in the sentence production task, estar only data revealed similar results as reported above for the combined copula data within either PI or TI group: a significant effect for time, as shown in significant differences between pre- and post-test 1 and between pre- and post-test 2, except the difference between post-test 1 and post-test 2 in the TI group. In other words, in the sentence production task, effects of both the PI and TI were retained over time. For the control group, there was no significant difference for time.

For the guided composition task (Table 2 and Figure 2.3), results resembled those reported above for the combined copula data. For the progress from the pre- to post-test 1, the PI and the TI groups performed equally well and both groups performed significantly better than the control group. From the pre-test to post-test 2 both instructional groups performed equally well; however, there was no significant difference between either PI or TI and the control groups, (these last two comparisons were significant in the combined copula data).

Regarding instructional effects over time, results of the guided composition task were also similar to those reported above for combined data. There was one interesting difference, however: A significant effect for time was also found for the control group ($F = 6.58, p = .00$), as evidenced by significant differences between the pre- and post-test 1, and between the pre- and post-test 2. No significant difference was found between post-test 1 and post-test 2. The unexpected improvement in the control group over time in writing compositions may stem from the low number of tokens produced for this task (see conclusions section for details).

Table 4 presents a summary of results of the post-hoc test on estar only data by task and post-test.

7.0 Discussion and Conclusion

This study focused on instructional effects of input processing—whether positive results of processing instruction found for clitic data (VanPatten & Cadierno 1993) can be generalized to words that convey semantic-grammatical concepts. The first set of statistical results from the three measurement tasks with ser and estar together suggest similar superior effects for processing and traditional instruction in comparison to results for the control group. However, when the data were analyzed by focusing on test items containing only estar, results of the interpretation task indicate that only PI was more effective than the control group and the instructional effects remained over time. Conversely, results of the TI for estar only on the interpretation task did not differ significantly from those of the control treatment on either post-test. Looking at estar only
data on the sentence-level written tasks and composition, PI, if not better, was as effective as the TI in production-oriented activities. Furthermore, no significant difference appeared in performance between PI and TI groups on any of the three tasks.

These results differ slightly from those of VanPatten and Cadierno (1993), which showed PI significantly better than TI in enabling learners to interpret the target structure. However, when their study focused on acquisition of Spanish clitics and word order, the present study attempted to promote the “intake” of ser and estar. Learning the differences between ser and estar is challenging for students, especially in some contexts with a certain subset of adjectives. Complicated linguistic properties of the copulas as multi-functional markers in combination with their low communicative value in general may have contributed to lack of significant difference between processing and traditional instruction in the acquisition of these verbs in this study when looking at combined copula data. However, when examining data of the marked copula (estar) the effects of processing instruction are more evident. The higher communicative value of the word-order processing in VanPatten and Cadierno’s study (1993) is possibly a reason that the clitic pronouns are more susceptible to differing types of instruction than the copulas (with relatively low communicative value) in this study.

Additionally, practices in TI treatment combined mechanical drills and meaningful, communicative practices. Closer examination of instructional materials reveals that traditional materials in this study included mechanical drills, but also provided substantially more meaningful and communicative activities than those included in the TI treatment of VanPatten and Cadierno (1993). Those meaningful practices in the TI in this study might have somehow encouraged more output processing by the students. Swain (1995) hypothesizes that pushed output facilitates acquisition by enabling learners to notice the gap between what they want to say and what they are able to say. Learners’ attention was drawn to notice the mismatch, which might be another plausible reason for no significant difference between the PI and TI groups in interpreting and producing sentences with the Spanish copulas. As suggested by Farley (2001), the effects of meaning-based output production contribute to lack of significant difference between the two instructional treatments. However, future study on the Spanish copula should further examine this variable in instructional treatments.

With regard to the accessibility of knowledge learned through instruction, traditional instruction appeared to have limited effects. For the combined copula data, the TI group outperformed the control group on the interpretation task on post test 2, but was not superior to the control group in the interpretation task on post-test 1 nor in the sentence production task on post-test 1. When analysis focused on the estar only data, the TI was not significantly different from the control-group treatment on the interpretation task in either post-test or the sentence production task in the second post-test. Pressure of producing a target form in the TI may have left students little room to digest and process input to engage in effective form-meaning mapping of ser and estar. The TI group only outperformed the control group in production tasks (sentence completion [post-test 2] and composition [post-tests 1 and 2]) that they had already practiced during the instructional phases. However, for the estar only data, PI showed superior effects to the control group’s instruction in interpretation and the two production tasks, except the delayed interpretation task.

Performance of the processing group suggests that students reacted to the stimuli of manipulated input insofar as they mentally readjusted and accommodated new linguistic data to their own developing rules of ser and estar. More importantly, this newly-developed system of Spanish copulas was accessible when learners constructed sentences, a procedure not practiced during the instructional phase. Therefore, altering learners’ strategy of over-generalizing ser makes students more capable not only of perceiving and processing, but also of producing the target forms. Performance of the traditional instruction group implies that knowledge learned from merely practicing output exercises has less likelihood of altering learners’ mental representation of the target forms.

As evidenced by overall findings of the significant difference between the two instructional
groups and the control group, both processing and traditional instructions successfully highlighted the subtle distinction between ser and estar. Nevertheless, PI appears more effective in helping students make correct form-meaning mapping and in restructuring their mental representation of target forms as evident in the estar only data.

The data from guided composition assessment presented a unique problem. The control group progressed over time in written discourse while describing a series of pictures forming a narrative. Though students were instructed to use the 12 adjectives provided, the tokens produced in the written texts across groups were relatively low overall. This low number of tokens renders results of the test of written discourse questionable. If, as Geeslin (2000) suggests, different types of adjectives are acquired at different rates, it is plausible that the error rate of estar in analysis of the composition data revealed little about copula choices in general. Future studies of processing instruction on copulas should investigate various task effects at the discourse level.

One methodological limitation of this study and other studies on PI is the limited time span in which retention effects were measured: a period of less than one month after the instructional treatments. Future studies should examine longer time periods to assess the durability of instructional effects. Still, findings of this study point to more effective pedagogical approaches from the perspective of input processing and open avenues for research on processing other problematic grammatical features such as teaching the distinctions of aspect of the Spanish past tense, prepositions or other function words that carry little inherent meaning.

Notes

1The author would like to thank Bill VanPatten, James Lee, and Fred Davidson for their valuable input during this study. Special thanks go to Joseph Feustle, Bill VanPatten, Ronald Leow, three anonymous reviewers and the associate editor for their helpful comments during the drafting of this manuscript.

2Input here refers to the pure linguistic data that learners are exposed to (Schwartz 1993) and not to explanations about a second language given to learners nor the explicit information of grammatical properties of the second language. VanPatten (1996) suggests that knowledge learned through traditional instruction does not affect acquisition and is used for monitoring (Krashen 1982) in the output process.

3An effort was made to make comparable the numbers of adjectives and past participles used with target forms in TI and PI materials. In the TI materials, there were 23 tokens of the [ser + adj.] construct, 49 in the [estar + adj.], 16 in the [ser + p.p.], and 23 in [estar + p.p.]; while in PI materials, there were 26 tokens in the [ser + adj.] construct, 41 in the [estar + adj.], 17 in the [ser + p.p.], and 14 in [estar + p.p.]. Since estar is problematic for beginning learners, there was more exposure of uses of estar than ser in general. Instructional materials may be obtained by requesting them from the author.

4The formula for TLU is: TLU = \( \frac{x}{c+y} \)

Note: x = number of correct suppliance in obligatory contexts, y = number of suppliance in non-obligatory contexts, c = number of obligatory contexts.

5This relative markedness relationship between the Spanish copulas was posited by Finnemann (1990): ser = unmarked for [+dimensionality] and estar = marked for [+dimensionality]. Acquisition of the more semantically charged (marked) copula estar may be more difficult and thus more affected by formal instruction. The markedness of a form is not the same as its communicative value. Markedness is inherent to the form, whereas communicative value is determined by the context of the form.

6The potential of data contamination, that is, exposure to target forms outside the experiment, may provide one plausible explanation for this improved performance (cf. Leow 1999 for further discussion of internal and external validity of experimental research in SLA).

Works Cited


## Table 1
Results of the Analyses of Variance for Combined *Ser* and *Estar*

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
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<tbody>
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<td>Instruction</td>
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<td>0.00**</td>
</tr>
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<td>Time</td>
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<td>5.88</td>
<td>0.00**</td>
</tr>
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<td>47.03</td>
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</tr>
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<td>Instruction x Time</td>
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<td>7.58</td>
<td>2.74</td>
<td>0.03*</td>
</tr>
<tr>
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<td>Instruction</td>
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<td>3.07</td>
<td>6.11</td>
<td>0.00**</td>
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*p < .05; **p < .01

## Table 2
Summary Table of ANOVAs for *Estar* only

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<tr>
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<th>F</th>
<th>P</th>
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</thead>
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<td>31.04</td>
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<td>4.87</td>
<td>2.48</td>
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<td>3.88</td>
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<td>1.79</td>
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<td>0.02*</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01*
Figure 1.1
Interaction Plot for Instruction and Time in the Interpretation Task for *Ser* and *Estar*

Score range: 0-10 points

---

Figure 1.2
Interaction Plot for Instruction and Time in the Sentence Production Task for *Ser* and *Estar*

Score range: 0-10 points
The Effects of Processing Instruction

Figure 1.3
Interaction Plot for Instruction and Time Using Arc-sine Transformed Scores in the Composition Task for *Ser* and *Estar*

![Interaction Plot for Instruction and Time Using Arc-sine Transformed Scores in the Composition Task for *Ser* and *Estar*](image)

Score range 0-6 points

Figure 2.1
Interaction Plot for Instruction and Time in the Interpretation Task for *Estar*

![Interaction Plot for Instruction and Time in the Interpretation Task for *Estar*](image)
Figure 2.2
Interaction Plot for Instruction and Time in the Sentence Production Task for *Estar*

Score range 0-6 points

Figure 2.3
Interaction Plot for Instruction and Time in the Composition Task for *Estar*
Table 3
Summary of Post-hoc Results of Combined Copula Data by Task and Post-test

<table>
<thead>
<tr>
<th>Task I-</th>
<th>Task I-</th>
<th>Task II-</th>
<th>Task II-</th>
<th>Task III-</th>
<th>Task III-</th>
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</thead>
<tbody>
<tr>
<td>Interpretation</td>
<td>Interpretation</td>
<td>Sentence</td>
<td>Sentence</td>
<td>Guided</td>
<td>Guided</td>
</tr>
<tr>
<td>Post-test 1</td>
<td>Post-test 2</td>
<td>Production</td>
<td>Production</td>
<td>Post-test 1</td>
<td>Post-test 2</td>
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</tbody>
</table>

| PI > Control | PI = Control | PI > Control | PI > Control | PI > Control | PI > Control |
| TI = Control | TI > Control | TI = Control | TI > Control | TI > Control | TI > Control |
| PI = TI | PI = TI | PI = TI | PI = TI | PI = TI | PI = TI |

* Indicates results different from combined copula data

Table 4
Summary of Post-hoc Results of *Estar Only* Data Results by Task and Post-test

<table>
<thead>
<tr>
<th>Task I-</th>
<th>Task I-</th>
<th>Task II-</th>
<th>Task II-</th>
<th>Task III- Guided</th>
<th>Task III- Guided</th>
</tr>
</thead>
<tbody>
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<td>Interpretation</td>
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<td>Sentence</td>
<td>Composition</td>
<td>Composition</td>
</tr>
<tr>
<td>Post-test 1</td>
<td>Post-test 2</td>
<td>Production</td>
<td>Production</td>
<td>Post-test 1</td>
<td>Post-test 2</td>
</tr>
</tbody>
</table>

| PI > Control | PI = Control | PI > Control | PI > Control | PI > Control | PI = Control |
| TI = Control | *TI = Control | *TI > Control | *TI = Control | TI > Control | TI = Control |
| PI = TI | PI = TI | PI = TI | PI = TI | PI = TI | PI = TI |