

RESEARCH

Open Access



Re-examining the effectiveness of processing instruction components for teaching the present subjunctive: Do learning styles make a difference?

Mastaneh Haghani* and Mojgan Rashtchi

*Correspondence:
mst.haghani@gmail.com

TEFL Department, Faculty
of Foreign Languages, North
Tehran Branch, Islamic Azad
University, Tehran, Iran

Abstract

The present quasi-experimental study investigated which component of processing instruction (PI) is responsible for its beneficial effects and whether EFL learners with different learning styles similarly benefit from PI components. In doing so, a sample of 67 first-year students took part in a study with a non-equivalent control group pre-test–posttest design. The participants were randomly divided into three groups: one receiving explicit information without further exercises (EI group), another receiving structured input activities comprising both referential and affective activities without explicit information (SI group), and the third group receiving processing instruction containing both explicit information and structured input activities (PI group). First, Ehrman and Leaver's (E & L) Construct questionnaire was employed to categorize the participants into ectenic and synoptic learners in each group. Afterward, a General Language Proficiency Test (GLPT) and a Target Structure Test were administered. After the treatment, the learners took a posttest modeling the pretest. The independent samples t-tests run in each group revealed no significant differences between the ectenic and synoptic learners' performance regarding the components of PI. However, the findings suggested that the ectenic learners benefited least from the SI activities, and the advantageous effect of PI was mainly related to EI. Pedagogical implications of the study for opposing learning styles are discussed, and suggestions are provided for further research.

Keywords: Explicit information, Learning styles, Processing instruction, Structured input activities

Introduction

One of the critical issues in Second Language Acquisition (SLA) is whether instruction is a decisive factor in language learning. Some scholars believe teaching has a minor role in language learning, while others emphasize the necessity of instruction. Krashen (1981) holds that instruction can have only a limited role in language acquisition. He argues that exposure to message-oriented input rather than grammatical

instruction results in language acquisition. In his viewpoint, providing comprehensible input in a stress-free atmosphere ensures language acquisition.

Pienemann's Processability Theory also considers a limited role in language instruction. Pienemann (1989) argues that learners go through developmental stages to acquire a particular structure. As these stages develop over time, failure to acquire a structural issue at a lower level hinders the acquisition of some other elements hinged upon it. He even considers a detrimental role for instruction when it is employed without due attention to the developmental stage the learner is experiencing. The researchers who endorse formal instruction refer to its beneficial effect on the language learning process in three major domains (Ellis, 1994; Sadeghi & Ghaderi, 2018): Instruction might accelerate L2 acquisition when the learner is developmentally ready for the acquisition of linguistic elements (*rate of acquisition*); L2 learners exposed to instruction might learn certain linguistic features differently from those who acquire an L2 in a naturalistic context (*the route*); the end-state of language proficiency for the L2 learners receiving instruction might be higher than the non-instructed learners (*Level of interlanguage development*).

The beneficial impact of formal instruction motivated myriads of research (Azizpour & Alavinia, 2021; Bakhshandeh & Jafari, 2018; Bui, 2016; Kang et al., 2018; Rashtchi & Etebari, 2018; Rashtchi & Khosroabadi, 2009; Weda & Sakti, 2018). However, the history of SLA has also witnessed considerable shifts in attitudes toward optimal language instruction. The primary cause of these changes has been the shift of focus from a paradigmatic approach to grammar instruction known as Focus on FormS (FonFS), which followed a structuralist syllabus and a type of explicit grammar instruction where the L2 learners' focal attention was on linguistic forms. However, FonFS was overshadowed by a new approach to grammar instruction known as FonF, "an instruction that draws students' attention to linguistic elements as they arise incidentally in lessons whose overriding focus is on meaning or communication" (Long, 1991, pp. 45–46). In FonF instruction, the learner's role changed from a language learner to a language user, and getting involved in communicative activities became a prerequisite for language learning (Chen & Li, 2022). The emergence of FonF instruction was triggered by a wave of scholars who underscored the crucial role of input in language acquisition (Ellis, 1994; Gass, 1988; Krashen, 1981; Long, 1988). The term FonF was coined by Long (1988) but construed and implemented diversely by various scholars (Ellis, 2016).

In his recent modification of FonF, Long (2015) states that FonF should be compatible with the learners' internal processing ability. It may not be necessarily interactive or implemented implicitly. Still, it can be catered to explicit instruction as long as L2 learners' 'Selective Attention' (a term proposed by Ellis, 1994) is drawn to the form. However, another related issue is what kind of FonF instruction serves more beneficial to promote L2 acquisition. One such method which has inspired much research is Processing Instruction (PI), an input-based grammar instruction introduced to the field as a pedagogical implication of VanPatten's Input Processing (IP) Model (VanPatten, 1996, 2004).

IP Model is grounded on the assumption that input has a crucial role in language acquisition (Benati, 2005, 2017; VanPatten, 2015). It perceives input processing through the eyes of L2 learners and points to the erroneous strategies they employ during comprehension. Drawing upon the principles of IP, PI tries to rectify such strategies by

exposing L2 learners to comprehension-based activities rather than pushing them to get involved in output-based activities too prematurely (Benati & Batziou, 2019).

Theoretical foundations

PI is a pedagogical intervention theoretically rooted in VanPatten's IP model. IP theory's central assumption is that L2 learners have limited processing capacity. Thus, in order not to be overloaded by the incoming data, learners are impelled to rely on erroneous default strategies regardless of their mother tongue (VanPatten, 2003). The psycholinguistic strategies have been expounded through two overarching principles and their subprinciples. The first principle, *the Primacy of Meaning Principle*, suggests that when exposed to input, L2 learners focus on the message it conveys rather than how the message is encoded (Benati, 2022; VanPatten, 2004, 2007). Benati and Lee (2010) hold that *the Primacy of Meaning Principle*, predicated upon Peters' (1985) first language acquisition theory, states that when children are involved in an interaction, their attention is usually driven to the messages that are comprehensible to them.

The second principle, known as *First Noun Principle*, states that learners tend to process the first noun or pronoun they encounter in a sentence as the subject (Benati, 2022; VanPatten, 2004, 2007). The Principle suggests that the processing of the linguistic elements appears linearly and that human beings are predisposed to assigning the role of an agent or subject to the first noun they encounter in a sentence; however, the First Noun Principle may not be consistent with the linguistic pattern of the L2 learners' target language. The problem raised by this erroneous strategy is not just limited to getting the wrong order for the linguistic items; it causes various processing problems, the most important of which is relaying misinformation to the L2 learner's developing system.

As Benati (2004) points out, the superiority of PI over traditional methods lies in the fact that it offers a direct route for the learners to form intake from input and deliver it to the developing system. The remedial techniques implemented in the form of PI in formal contexts alter L2 learners' faulty processing strategies to optimal ones.

It is worth mentioning that Ehrman and Leaver's (E & L) Construct questionnaire, adopted in the present study, enjoyed certain features which made it suitable for the research:

- (1) E & L Construct questionnaire was hinged upon various cognitive style scales which had emerged during the twentieth century, so it benefited from the very same concepts presented in them (Leaver et al., 2005).
- (2) The other existing cognitive scales often led to confusion and misinterpretations since they had many overlapping concepts; however, E & L Construct questionnaire used a dichotomous, streamlined model by organizing twenty learning style scales into two major scales entitled *ectenic* versus *synoptic* learning styles.
- (3) The researchers believed that the two overarching categories of the E & L Construct questionnaire would serve the purpose of the present study, and further detailed descriptions of the other learning styles scales would derail the present research.

PI and its components

PI is implemented through the following steps:

1. Supplying EI on the target linguistic form, which should be focused on one at a time;
2. Drawing learners' attention to the erroneous strategies employed to process the target form and providing them with the strategies to replace their default nonoptimal ones;
3. Offering SI activities, consisting of a series of structured and comprehension-based tasks, designed purposefully to help learners make more appropriate form-meaning associations (see Benati, 2017; Haghani, 2020; Haghani & Maftoon, 2017; Henshaw, 2012) via two types of SI activities, known as *referential* and *affective activities*.

Referential activities require L2 learners to focus on the target form to complete the tasks. Such activities entail correct answers to some questions with dichotomous answers. To provide correct answers, learners should rely on the target form. However, *affective activities* help learners make appropriate form-meaning mappings by involving them in some meaning-based, communicative tasks. Such activities do not require L2 learners to provide any pre-determined responses. From a theoretical perspective, referential activities have been substantiated by the Noticing Hypothesis because they push learners to notice the form. As Schmidt (2001) suggests, although noticing may not ensure acquisition, it is crucial for converting any input into intake. Besides, since learners' focal attention is drawn toward the form during EI and SI referential activities, it can be construed that implementing affective activities can strengthen the form-meaning connections.

Related studies

The contribution of PI components to help learners adopt appropriate strategies has been the focus of a large body of empirical research: VanPatten and Oikkenon (1996) explored the relative effectiveness of each component of PI. The PI, SI-only, and EI-only groups were exposed to object pronouns and word order in Spanish. The result suggested that the beneficial effect of PI could be attributed to SI activities and not EI.

Replicating VanPatten and Oikkenon (1996), Benati (2004) conducted research within the framework of PI on gender agreement in Italian, yet he implemented one interpretation and two production tasks. The results, consistent with VanPatten and Oikkenon's (1996), pointed to identical gains in both SI and PI groups, suggesting that the beneficial effect of PI was the result of doing SI activities.

Fernandez (2008) sought to determine the contribution of EI to L2 learners' input processing. Addressing two different processing problems in Spanish (word order and subjunctive form), she implemented two treatment types in the two groups, each divided into EI and SI groups. The results indicated that in the group working on the word order, the results did not significantly differ; however, in the subjunctive group, the students receiving PI outperformed the SI group. Fernandez concluded that the beneficial role of EI might depend on the nature of the task and the processing problem.

Henshaw (2012) explored the efficacy of the components of SI in learning the Spanish subjunctive. The participants were divided into SI, Referential activities-only, and Affective activities-only groups and were also exposed to EI. The result ran counter to the previous studies: Although the groups showed some gains in the posttests, there were no significant differences in their results. Henshaw inferred that the determining factor for their learning was the EI that all groups had received, not the activities following it.

Empirical studies investigating the determining effects of PI components have become abundant (see Bagheri & Bagheri, 2016; Benati, 2020; Botana, 2013; Marsden & Chen, 2011; Sanz & Morgan-Short, 2004; Wong, 2004). However, to open up a new avenue for further studies, some SLA scholars have embarked on a line of research to examine the impact of various individual differences on PI (Agiasophiti, 2013; Angelovska & Benati, 2013; Santamaria, 2007). Following such studies, Lee (2013) characterizes L2 learners who benefit most from PI. He states that the number of learners who benefit from PI compared to those who may not is remarkable; however, it is crucial to characterize those individuals whose age, gender, learning style, grammar sensitivity, and the like may get in the way of their L2 acquisition. Lee hypothesizes that some learners might benefit more from PI while others might benefit least.

Motivated by the recent line of research, the present study sought to explore the beneficial effects of PI components. It took one step further to investigate whether learners with diverse learning styles would equally benefit from PI components. Although educationalists consider learning styles as biologically stable features, they generally believe that educational contexts can have a decisive role in inculcating different learning styles in the same individual learner (Brown, 2007; Reid, 1987). Thus, by probing into the question of which learners benefit more, the researchers of the current study aimed to characterize the Iranian educational contexts where specific pedagogical interventions might be successful.

Research questions

The following research questions guided the present study:

RQ1 Which of the explicit information (EI), structured input (SI), or processing instruction (PI) is more beneficial to teaching present subjunctives?

RQ2 Do ectenic and synoptic learners similarly benefit from EI, SI, and PI?

Method

Participants

Three groups with 67 first-year students (males and females) selected based on convenience sampling participated in the study. They were students of Translation Studies at Islamic Azad University, North Tehran Branch, who had registered for a grammar course and had selected the classes according to their schedule. Their ages ranged from 18 to 24. At the onset, they took a General Language Proficiency Test (GLPT) to enable the researchers to ensure their homogeneity. Besides, the students took a Target Structure

Test (TST) to determine to what extent they were familiar with the present subjunctive, which was the structure under scrutiny. The three groups were randomly assigned to Explicit Information group (EI, $n = 23$), the Structured Input group (SI, $n = 19$), and the Processing Instruction group (PI = 25), receiving different types of treatment.

Instruments

The following instruments were used for data collection:

E & L Construct Questionnaire

The first instrument was the E & L Construct Questionnaire, which the researchers administered to determine the participants' learning styles. E & L Construct Questionnaire designed by Ehrman and Leaver (2003) clarifies the misconceptions caused by numerous learning style terms prevalent among SLA scholars. Ehrman and Leaver proposed two overarching categories of *synoptic* learning for holistic and *ectenic* learning for an atomistic approach to learning. According to Leaver et al., (2005, p.70), "In foreign-language learning, synoptic learning is reliant on intuition and subconscious control whereas ectenic learning generally occurs under the conscious control of the learner." E&L Construct Questionnaire measures learning styles on a line graded from 1 to 9, which stretches in either direction towards each learning style pole.

General Language Proficiency Test (GLPT)

The second instrument was GLPT, adopted from a sample of the Preliminary English Test, administered to ensure the homogeneity of the participants before the treatment. The test is an international exam designed by Cambridge English Language Assessment developed for low-intermediate L2 learners. The speaking section was excluded due to some administration constraints.

Target Structure Test (TST)

The next instrument was the 40-item multiple choice TST, designed to examine the participants' familiarity with the structure in focus. The instrument, constructed at the sentence level, was used as the pretest and posttest. Its purpose was to eliminate learners familiar with the target structures in the pretest and examine the effectiveness of treatment types in the posttest. Three university grammar instructors with more than 10 years of experience reviewed the items to obtain content validity for TST. Their comments led to the modification or discard of several items. The reliability index estimated for the TST using KR-21 was 0.74. The scoring rubric allocated one point for each correct response, but no penalties were considered for the wrong answers. It is worth mentioning that the items of the TST were reordered in the posttest to control the practice effect.

The target structure used in the present study was the present subjunctive. In English, the present subjunctive is used to express urgency or importance. Since the verb in the subjunctive mood may not agree with its subject, it is distinctive only when its subject is in the third-person singular form or when the passive structure is employed. Subjunctive verbs appear in a subordinate clause connected to the main clause with "that." The main

clause might contain lexical complements (e.g., crucial, vital, essential, etc.), verbs (e.g., advise, order, suggest, etc.), or nouns (obligation, advice, etc.).

Examples I strongly recommend that he *retire*.

Is it really necessary that Mary *work* all day long?

It is vital that the child *be* stopped immediately.

The choice of the present subjunctive as the target structure of the present study was predicated upon two faulty processing strategies which EFL learners adopt: the *Lexical Preference Principle* and the *Sentence Location Principle* (VanPatten, 2004, 2007, 2018). The Lexical Preference Principle suggests that the lexical items have more communicative value than formal features of the input; thus, L2 learners, as limited capacity processors, rely on the lexical items of the input to get the meaning (VanPatten, 2004, 2007, 2018). Since L2 learners first process the lexical items within the main clause that suggest urgency or importance, the researchers speculated that they might fail to process the subjunctive marker, which, compared to the lexical items, has a lower communicative value and is +redundant. On the other hand, the *Sentence Location Principle* asserts that learners usually process the items appearing in the initial position in the sentence before those in the middle or final position. Since the subjunctive verb is located in the medial position, the researchers assumed that the participants might fail to process it. Therefore, the processing is usually problematic for Iranian EFL learners because of the discrepancy between the use of singular s- marker in the present simple in the indicative mood and the subjunctive mood.

Instructional materials

The researchers developed the instructional materials based on the guidelines suggested by VanPatten (2002, 2003, 2018), comprising the followings:

- (a) EI activities, containing both the explication of the present subjunctive and some points to help learners avoid the typical erroneous strategies they naturally employ when processing the key form.
- (b) SI activities, comprising both referential and affective, aimed at helping the participants develop optimal processing strategies. As VanPatten (2002, p. 766) suggests, referential refers to the activities “for which there is a right or wrong answer and for which the participants have to rely on the target structure to get meaning.” As the exercises were comprehension-based in both oral and written modes, the respondents had to respond by matching the correct response to the relevant item or choosing the right option in binary questions (“Appendix A”).

The affective activities implemented aimed to consolidate the optimal processing strategies the participants had been practicing in the referential activities. Contrary to the nature of referential activities, there were no right or wrong responses to the affective activities, and the participants were free to respond based on their viewpoints (“Appendix B”). All vocabulary items used in the instructional materials were roughly the same

Table 1 Number of ectenic and synoptic participants in groups

Groups	Ectenic	Synoptic	Total
EI	12	11	23
SI	10	9	19
PI	12	13	25

as those the participants had encountered in their course books to minimize the lexical load of the activities.

Three university instructors with more than 10 years of experience examined the SI activities for relevance and appropriateness. Afterward, the instructional materials were piloted with 50 male and female first-year students studying Translation Studies to investigate the feasibility of the procedure before the treatment. Based on the feedback received from the pilot study, SI activities were modified.

Procedure

Test administrations and the treatment took five sessions. First, the participants, selected based on convenience sampling, in the three EI, SI, and PI groups took the E&L Construct Questionnaire to obtain evidence regarding their learning styles. One of the researchers was present at the administration time to clarify any problems the participants might encounter. Before the administration, the researcher explained to the learners that learning styles are value-neutral and that gravitating to one learning style is not considered an advantage. The scoring procedure was based on the scoring key offered by Ehrman and Leaver (2003). Table 1 shows the number of ectenic and synoptic learners in each group based on the questionnaire:

In the next step, GLPT was administered to examine whether the participants were homogenous regarding general English proficiency. Each correct response to the test was given one point, while there was no penalty for incorrect answers. The time allocated for completing the test was 90 min. The participants also took the TST to enable the researchers to determine participants' familiarity with the present subjunctive. The participants could ask about the meaning of the words whenever needed, which could help control the effect of errors on their grammar knowledge. As the TST comprised 40 items, the time allocated for the TST was 40 min.

EI group

The participants were exposed to EI on the present subjunctive, followed by the teachers' attempt to draw the learners' attention to the typical erroneous default processing strategies that L2 learners commonly adopt. The students were not required to do any SI activities to practice the present subjunctive. However, after the provision of EI, the teacher asked if they had any questions. In other words, she welcomed any quarries related to the target structure.

After the treatment, the PI, SI, and EI groups participated in the comprehension-based target language posttest to compare how different learning styles might benefit from PI components. The researchers assigned the same time limits for the activity

administration and assessment measures in all three groups to enhance the internal validity of the research.

SI group

Based on the procedure used in VanPatten and Oikkenon (1996), the teacher did not provide the participants with any EI on the target structure or give any warnings regarding the typical faulty strategies they were supposed to avoid. The participants were first required to interpret some examples of the present subjunctive, and the teacher only gave them some feedback on their speculations. Then the participants were required to perform the SI activities in the form of reflective and affective tasks (as described above) in both oral and written modes. Without further explanations, the teacher would provide feedback to the learners on whether their responses were correct or incorrect. It is worth mentioning that the time allocated for implementing the SI activities (i.e., reflective and affective tasks) both in the SI and PI groups was about 30 min.

PI group

Initially, the PI group was exposed to an explication of present subjunctives and their application in English. Students' attention was also drawn to the faulty strategies L2 learners typically employ. Based on the procedure proposed by VanPatten and Oikkenon (1996), input-based SI activities comprising reflective and affective activities in both written and oral modes followed EI. The participants had to choose the appropriate responses to the questions or match the answers to the relevant statements to employ optimal processing strategies. The affective activities following the reflective ones were in a binary format requiring the learners to express their opinions (*I agree/ I disagree*, or *True about me/Not true about me*), reinforcing what they had been practicing in the previous tasks. The teacher did not know the students' responses since they answered based on their viewpoints.

Data analyses

The researchers used the following statistical analyses to answer the research questions:

First, to determine the participants' learning styles, the researchers used the E & L Construct Questionnaire Scoring Key to analyze the questionnaires. Then, a one-way Analysis of Variance (ANOVA) on GLPT was run to ensure that the three groups possessed the same language proficiency level before the treatment. One-way ANOVA was also used to analyze the data obtained from TST to examine whether the learners had the same knowledge of the target language before the treatment. The descriptive statistics helped to check the participants' performance on the posttest. Finally, to compare the results of the different learning styles' performance on the posttest, independent samples t-tests were run.

Results

Table 2 shows the mean and the standard deviations of the groups obtained from the GLPT, EI ($M = 26.6$, $SD = 5.2$), SI ($M = 25.5$, $SD = 6.2$), and PI ($M = 26.9$, $SD = 3.1$). As shown, the means of the groups are close to each other.

Table 2 Descriptive statistics of the groups on GLPT

Groups	N	Mean	SD	Std. error	Min	Max
EI	23	26.60	5.20	1.08	15.50	37.00
SI	19	25.50	6.20	1.40	11.00	34.00
PI	25	26.90	3.10	.63	20.00	34.00

Table 3 One-way ANOVA on GLPT

	Sum of squares	df	Mean square	F	Sig.
Between groups	21.84	2	10.92	.45	.63
Within groups	1548.30	64	24.19		
Total	1570.15	66			

Table 4 One-way ANOVA of TST, pretest

	Sum of squares	df	Mean square	F	Sig.
Between Groups	25.94	2	12.97	.56	.56
Within Groups	1459.69	64	22.80		
Total	1485.64	66			

Table 5 Descriptive statistics of TST, posttest

	N	Mean	SD	Std. error	95% confidence interval for mean		Min	Max
					Lower bound	Upper bound		
EI	23	28.17	6.07	1.26	25.54	30.80	16.00	36.50
SI	19	22.47	8.87	2.03	18.19	26.74	8.00	39.00
PI	25	30.72	6.44	1.28	28.06	33.37	14.00	39.00
Total	67	27.50	7.76	.948	25.61	29.40	8.00	39.00

ANOVA was run to examine whether there were statistically significant differences among the means of the groups. As Table 3 indicates, no significant differences existed on the GLPT $F(2, 64) = 0.45, p = 0.639$, showing the participants' same level of language proficiency before the treatment.

As shown in Table 4, the one-way ANOVA results suggest no significant differences among the means of the groups in the pretest $F(2, 64) = 0.56, p = 0.57$. Thus, it can be concluded that there was no significant difference between the groups regarding their knowledge of the target structure before the treatment.

After the treatment, the TST was administered again. Table 5 shows the means and the standard deviations acquired in the posttest (TST) across the three groups: EI ($M = 28.1, SD = 6.07$), PI ($M = 30.72, SD = 6.44$), and SI ($M = 22.47, SD = 8.87$). As shown, the mean score of the PI group is the highest, and the mean score of the SI group is the lowest, suggesting that the SI group benefited least from the implemented tasks in the class.

As displayed in Table 6, an independent samples *t*-test was conducted to compare the ectenic and synoptic learners' mean scores on the TST after the treatment. It should be

Table 6 Independent samples T-test between ectenic and synoptic learners in EI group, posttest

	Levene's test for equality of variances		t-test for equality of means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean diff.	Std. error diff.	95% confidence interval of the dif	
								Lower	Upper
Equal variances assumed	.006	.93	.60	65	.54	1.152	1.90	4.96	2.65

Table 7 Independent samples T-test between ectenic and synoptic learners in SI group

	Levene's test for equality of variances		t-test for equality of means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean diff.	Std. error diff.	95% confidence interval of the difference	
								Lower	Upper
Equal variances assumed	.019	.89	.91	17	.37	3.74	4.09	12.38	4.89

Table 8 Independent samples T-test between ectenic and synoptic learners in PI Group, posttest

	Levene's test for equality of variances		t-test for equality of means						
	F	Sig.	t	df	Sig. 2-tailed	Mean diff.	Std. error diff.	95% confidence interval of the difference	
								Lower	Upper
Equal variances assumed	1.078	.310	.235	23	.816	.6185	2.6305	6.0603	

mentioned that the assumption of the homogeneity of variances was met ($p > 0.05$), so “Equal variances assumed” was reported. The result indicated that there was no significant difference in the scores obtained by the synoptic group ($M = 26.95$, $SD = 7.96$) and those of the ectenics ($M = 28.10$, $SD = 7.60$), $t(65) = 0.60$, $p = 0.54$.

Likewise, in the SI group, an independent samples t -test was run to compare the two learning styles' mean scores. As displayed in Table 7, the assumption of the homogeneity of variances was assumed ($p > 0.05$). The result showed no significant difference in the scores obtained by the ectenics ($M = 20.70$, $SD = 9.38$) and the synoptics ($M = 24.44$, $SD = 8.33$), $t(17) = -0.91$, $p = 0.37$.

As displayed in Table 8, an independent samples *t*-test was conducted to compare the means of the two learning styles. It should be noted that the assumption of the homogeneity of variances was met ($p > 0.05$). Thus, “Equal variances assumed” was reported. The analysis indicated that there was no significant difference in the scores obtained by the synoptics ($M = 30.42$, $SD = 6.04$) and those of the ectenics ($M = 31.04$, $SD = 7.10$), $t(23) = -0.23$, $p = 0.81$, suggesting that both groups equally benefited from the PI presented to them.

Discussion

The purpose of the present study was twofold: to explore which PI components promote L2 learning and whether the two major learning styles equally benefit from the PI components. As evidenced by the result, the three groups gained significantly throughout the study, which points to the beneficial effects of PI. However, the comparison of the means of the groups revealed that the PI and EI groups outperformed the SI group. Thus, it can be inferred that the causative variable in PI, which promoted learning, might have been due to the EI the students received. As researchers suggest (e.g., Ellis & Wulff, 2015; Fernandez, 2008; Gass & Mackey, 2015), EI facilitates language acquisition by helping L2 learners “notice” the formal properties of the target structure, which might otherwise be left unattended. Moreover, it promotes explicit knowledge of the target language, which will help L2 learners to verbalize the grammatical rules (Bakhshandeh & Jafari, 2018; Basturkmen, 2018).

The reason the EI component was successful might be related to various factors. One such factor might be associated with the context of formal instruction in Iran and the participants’ expectations (Nazari, 2013; Rashtchi & Mohammad Yousefi, 2016). As the learners in the present study were Iranian university students, they were accustomed to explicit information when exposed to a grammatical structure. Thus, the participants in the SI group felt perplexed when they were pushed to make inferences and had to suffice to the feedback they received when doing SI activities, which might not have met their expectations.

Another explanation might be related to the nature of the target structure involved. According to VanPatten et al. (2013), “EI affects processing if the information is easy and portable enough to use during real-time processing” (p. 524). When the target structure rules are easy, the EI exposed to the learner can readily be utilized during input processing. Still, EI fails to have a significant role if the rules involved are too complicated to be applied during input processing. The participants were encouraged to notice the subordinate clause to learn the present subjunctive and the strategy they had to follow. It turned out that the learners could readily readjust their default strategy.

The present study, which signifies that EI promotes L2 learning, is consistent with Kondo-Brown (2000), who reported that EI is enough to convert input into intake and that the role of SI is non-significant. However, it runs counter to a sizeable amount of research which reported that the causative factor contributing to the learners’ language acquisition in PI is SI activities, and EI has a minor role in promoting the observed learning gains (Benati, 2020; Fernandez, 2008; Sanz & Morgan-Short, 2004; VanPatten & Oikkenon, 1996; Wong, 2004). The results indicated that EI was enough to promote

learning; however, as a limitation in the current study, no delayed posttest was administered to measure the learners' knowledge over a long period. Thus, it is not clear whether the knowledge gained through EI exposure is stored in the learners' long-term memory.

The results did not show any significant difference between the mean scores of the two learning styles and the kind of activities practiced in the groups, indicating that the participants with any of the two learning styles similarly benefited from the three treatment types. However, the ectenics and synoptics in the PI and EI groups outperformed those in the SI group, reflecting that learning style might not be a determining variable in creating a large effect size. Thus, drawing upon the result of the present study and what has been documented in the related literature regarding the impact of individual differences on the differential effects of PI components, the researchers cannot determine who benefits most or least from PI components. Thus, they take a debatable position and assert that the impact cannot result from how one facet of individual differences (e.g., learning styles, age, language background, and the like) interacts with PI components. The educational context where individuals are exposed to the target language might also affect how learners benefit from the instructional intervention. In an Iranian educational setting, both atomistic and holistic learners may not benefit from the follow-up SI activities and lack the autonomy or ambiguity of tolerance to benefit from less structured language classes. They cannot induce grammatical rules in such situations, and EI is always required to make a difference.

Thus, the pedagogical implication of the present study suggests that to preclude learners' reliance on EI, teachers can incorporate some tasks, such as class surveys, team projects, pair work, or working in groups, to foster learner autonomy so that they can cope with the situations where they do not have a complete understanding of the input. Another implication the findings offer is that teachers can devise some activities to help learners extend their learning styles and adopt style-flexing (style-stretching), which can help them adopt the appropriate learning style when necessary.

Limitations and future research

As with any study, the present study was subject to some limitations, which might be the focus of future studies. The primary limitation was the non-random sampling of the participants. As the students were assigned to classes by the university registration office, a random selection of the participants was not possible. The small sample size due to the admission of a small number of people to the college of Translation studies at Islamic Azad University, North Tehran Branch, was another limitation of the study. The third limitation imposed on the study was time restriction, which forced the researchers to focus on only one grammatical structure to explore the beneficial effects of PI components. Further studies can examine whether the nature of grammatical structure might affect the beneficial impacts of PI components. Besides, the study focused on low-intermediate adult learners; other studies may investigate the efficacy of PI components when different age groups or language proficiency levels are concerned. Researchers can also examine the use of some activities through implementing digital games to investigate whether it would encourage learner autonomy and promote EFL learners' ambiguity tolerance in EFL contexts where teacher-fronted classrooms are practiced.

Conclusion

The present study revealed that contrary to some aspects of individual differences, which function as determining factors affecting the success of PI, learning styles cannot influence the interaction between the learners’ IP and the kind of PI exposed to them. The results suggested that both synoptic and ectenic learners in the PI and EI groups were more successful than those in the SI group, regardless of their learning styles. The present study also showed that the beneficial effect of PI could be attributed to the EI presented to the learners. Unsurprisingly, the finding was inconsistent with most studies replicated to investigate the role of PI components and considered a more critical role for SI activities. Examining the educational settings where the replications were conducted indicates that the educational context can be an intervening factor influencing the results. One speculation about the discrepancy of the results can point to the fact that such studies have mostly been conducted in an English-speaking country or a second language setting where the learners are provided with various opportunities for exposure to the target language, tackle the ambiguities, form hypothesis, and receive feedback from native speakers. As a result, L2 learners in such contexts tend to become more autonomous and benefit more from SI activities. However, in the Iranian educational context, English is taught as a foreign language, and the learners have little chance to receive input outside their classes. The instructional settings encourage EFL learners to rely on explicit information to deal with the ambiguities of language learning. As a result, they do not develop ambiguity of tolerance and are less reliant on their intuition to infer the grammatical rules presented in SI activities. The findings portray the status quo of the EFL setting in Iran and shed light on the educational context as a forceful factor affecting the learning process. However, further research is needed to confirm the present research results.

Appendix A

Samples of referential activities (reading mode)

Choose the correct answer for the following statements

1. He ordered that all aircrafts ----- to the base immediately.

-
- | | |
|----------------|---------------------|
| a. returned | b. are returned |
| c. be returned | d. will be returned |
-

2. The movie director demanded that everything about his production ----authentic.

-
- | | |
|-------------|--------|
| a. is | b. was |
| c. has been | d. be |
-

Sample of the referential activities (listening mode)

You are going to hear some statements. Listen to them carefully and choose the right items which correspond to them.

1. The sentence means:
 - a. Jane should talk to the staff
 - b. The head of the department should talk to Jane
 - c. The staff should talk to the head of the department.

2. The sentence means:
 - a. Jane’s parents shouldn’t go to the party.
 - b. Jane shouldn’t go to the party.
 - c. Jane doesn’t want her parents to go to the party.

Script for the above sample:

1. Jane recommended that the staff talk to the head of the department. The sentence means:
2. Jane’s parents requested that she not go to the party. The sentence means:

Appendix B

Samples of the affective activities (listening mode)

A. In this section, you are going to listen to some statements about John’s life. Which is true about you? Circle the appropriate phrases:

1. True about me	Untrue about me
2. True about me	Untrue about me

Script for the above sample

1. John’s parents advised that he not return home late at night.
2. John’s parents insisted their son have a traditional marriage.

B. You are going to hear some statements. Circle *logical* if they seem logical to you and circle *illogical* if they do not seem logical to you.

1. Logical	Illogical
2. Logical	Illogical

The script for the above sample:

1. The police demand that drivers not drink while driving.
2. It is necessary that children receive proper education

Acknowledgements

We are indebted to the participants who voluntarily participated in this study and kindly consented to cooperate in the classes to help the researchers collect the required data.

Author contributions

Both authors contributed to the different stages of the study, including data collection and analysis, and reporting of the content. They both read and approved the final manuscript.

Funding

No funding was received for the current study.

Availability of data and materials

The data are available and can be accessed by other researchers upon request.

Declarations

Ethics approval and consent to participate

The authors followed the official ethical procedures implemented at their institution for involving human participants.

Consent for publication

All participants volunteered to take part in the current study and filled in and signed a consent form.

Competing interests

The authors declare that they have no competing interests.

Received: 26 July 2022 Accepted: 1 December 2022

Published online: 07 February 2023

References

- Agiasophiti, Z. (2013). Exploring possible effects of gender and enhanced vs unenhanced processing instruction on the acquisition of case marking in L2 German. In J. F. Lee & A. Benati (Eds.), *Individual differences and processing instruction* (pp. 153–184). Equinox.
- Angelovska, T., & Benati, A. (2013). Instruction and the age factor: Can adults and school-age native speakers of German process English simple past tense correctly? In J. F. Lee & A. Benati (Eds.), *Individual differences and processing instruction* (pp. 131–152). Equinox.
- Azizpour, Sh., & Alavinia, P. (2021). The impact of focus on form and focus on forms instruction on grammar acquisition of the subjunctive by Iranian advanced EFL learners. *Teaching English Language*, 15(1), 215–249. <https://doi.org/10.22132/TEL.2021.134368>
- Bagheri, B., & Bagheri, A. (2016). The impact of structured input-based tasks on L2 learners' grammar learning. *International Journal of Foreign Language Teaching and Research*, 4(13), 47–57.
- Bakhshandeh, S., & Jafari, K. (2018). The effects of input enhancement and explicit instruction on developing Iranian lower-intermediate EFL learners' explicit knowledge of passive voice. *Asian-Pacific Journal of Second and Foreign Language Education*. <https://doi.org/10.1186/s40862-018-0060-4>
- Basturkmen, H. (2018). Explicit versus implicit grammar knowledge. In *The TESOL encyclopedia of English language teaching* (pp. 1–6). <https://doi.org/10.1002/9781118784235.eelt0060>.
- Benati, A. (2004). The effects of processing instruction and its components on the acquisition of gender agreement in Italian. *Language Awareness*, 13, 67–80. <https://doi.org/10.1080/09658410408667087>
- Benati, A. (2005). The effects of processing instruction, traditional instruction and meaning_ output instruction on the acquisition of the English past simple tense. *Language Teaching Research*, 9(1), 67–93. <https://doi.org/10.1191/1362168805lr1540a>
- Benati, A., & Batziou, M. (2019). Discourse and long-term effects of isolated and combined structured input and structured output on the acquisition of the English causative form. *Language Awareness*, 28(2), 77–96. <https://doi.org/10.1080/09658416.2019.1604721>
- Benati, A., & Lee, J. (2010). *Processing instruction and discourse*. Continuum.
- Benati, A. (2017). The role of input and output tasks in grammar instruction: Theoretical, empirical and pedagogical considerations. *Studies in Second Language Learning and Teaching*, 7(3), 377–396. <https://doi.org/10.14746/ssllt.2017.7.3.2>
- Benati, A. (2020). The effects of structured input and traditional instruction on the acquisition of the English causative passive forms: An eye-tracking study measuring accuracy in responses and processing patterns. *Language Teaching Research*. <https://doi.org/10.1177/1362168820928577>

- Benati, A. (2022). Structured input and structured output on the acquisition of English passive constructions: A self-paced reading study measuring accuracy, response and reading time. *System*, 110(2022), 102882. <https://doi.org/10.1016/j.system.2022.102882>
- Botana, G. P. (2013). *The role of task-essentialness and explicit information in processing instruction*. Doctoral dissertation, University of Maryland, College Park.
- Brown, D. H. (2007). *Principles of language learning and teaching* (5th ed.). Pearson.
- Bui, T. S. (2016). Pronunciation of consonants /θ/ and /ð/ by adult Vietnamese EFL learners. *Indonesian Journal of Applied Linguistics*, 6(1), 125–134.
- Chen, M., & Li, W. (2022). The influence of form-focused instruction on the L2 Chinese oral production of Korean native speakers. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2022.790424>
- Ehrman, M., & Leaver, B. L. (2003). Cognitive styles in the service of language learning. *System*, 31, 393–415. [https://doi.org/10.1016/S0346-251X\(03\)00050-2](https://doi.org/10.1016/S0346-251X(03)00050-2)
- Ellis, R. (1994). *The study of second language acquisition*. Oxford University Press.
- Ellis, R. (2016). Focus on form: a critical review. *Language Teaching Research*, 20, 405–428. <https://doi.org/10.1177/1362168816628627>
- Ellis, N., & Wulff, S. (2015). Usage-based approaches to SLA. In B. VanPatten & J. Williams (Eds.), *Theories in second language acquisition* (2nd ed., pp. 75–93). Routledge.
- Fernandez, C. (2008). Re-examining the role of explicit information in processing instruction. *Studies in Second Language Acquisition*, 30(3), 277–305. <https://doi.org/10.1017/S0272263108080467>
- Gass, S. (1988). Integrating research areas: A framework for second language studies. *Applied Linguistics*, 9(2), 198–217. <https://doi.org/10.1093/applin/9.2.198>
- Gass, S., & Mackey, A. (2015). Input, interaction and output in second language acquisition. In B. VanPatten & J. Williams (Eds.), *Theories in second language acquisition* (2nd ed., pp. 180–206). Routledge.
- Haghani, M. (2020). The influence of learning styles and input modalities on the simultaneous attention to form and meaning. *Issues in Language Teaching*, 9(1), 213–243. <https://doi.org/10.22054/ilt.2020.51000.477>
- Haghani, M., & Maftoon, P. (2017). The effect of learning styles on the Iranian EFL learners' processing of the subject/agent in a sentence. *Modern Journal of Language Teaching Methods*, 7(3), 143–154. <https://doi.org/10.26655/mjltm.2017.3.1>
- Henshaw, F. (2012). How effective are effective activities? Relative benefits of two types of structured input activities as part of a computer-delivered lesson on the Spanish subjunctive. *Language Teaching Research*, 16(3), 393–414. <https://doi.org/10.1177/1362168812436919>
- Kang, E. Y., Sok, S., & Han, Z. (2018). Thirty-five years of ISLA on form-focused instruction: A meta-analysis. *Language Teaching Research*, 23(4), 428–453. <https://doi.org/10.1177/1362168818776671>
- Kondo-Brown, K. (2000). Effects of three types of practice after explicit explanation. *Second Language Studies*, 19(1), 99–125.
- Krashen, S. (1981). *Second language acquisition and second language learning*. Pergamon.
- Leaver, B. L., Ehrman, M., & Shekhtman, B. (2005). *Achieving success at second language acquisition*. Cambridge University Press.
- Lee, J. F. (2013). Foci and general findings of research on processing instruction: Moving beyond limitations. In J. F. Lee & A. Benati (Eds.), *Individual differences and processing instruction* (pp. 19–46). Equinox.
- Long, M. H. (1988). Instructed interlanguage development. In L. M. Beebe (Ed.), *Issues in second language acquisition: Multiple perspectives* (pp. 115–141). Newbury House.
- Long, M. H. (1991). Focus on form: A design feature in language teaching methodology. In K. de Bot, R. B. Ginsberg, & C. Kramsch (Eds.), *Foreign language research in cross-cultural perspective* (pp. 39–52). John Benjamins.
- Long, M. (2015). *Second language acquisition and task-based language teaching*. Wiley.
- Marsden, E., & Chen, H. (2011). The roles of structured input activities in processing instruction and the kinds of knowledge they promote. *Language Learning*, 61(4), 1058–1098. <https://doi.org/10.1111/j.1467-9922.2011.00661.x>
- Nazari, N. (2013). The effect of implicit and explicit grammar instruction on learners' achievements in receptive and productive modes. *Procedia-Social and Behavioral Sciences*, 70, 156–162. <https://doi.org/10.1016/j.sbspro.2013.01.051>
- Peters, A. M. (1985). Language segmentation: Operating principles for the perception and analysis of language. In D. Slobin (Ed.), *The crosslinguistic study of language acquisition: Theoretical issues*. Lawrence Erlbaum.
- Pienemann, M. (1989). Is language teachable? *Applied Linguistics*, 10(1), 52–79. <https://doi.org/10.1093/applin/10.1.52>
- Rashtchi, M., & Khosroabadi, P. (2009). The effect of explicit focus on form and dictogloss tasks on learning English tenses. *Journal of Language Studies*, 1(1), 101–114.
- Rashtchi, M., & Etebari, F. (2018). Learning the English passive voice: A comparative study on input flooding and input enhancement techniques. *International Linguistics Research*, 1(1), 67–79. <https://doi.org/10.30560/ILR.v1n1p67>
- Rashtchi, M., & MohammadYousefi, L. (2016). Reading input flooding and listening input flooding: Do they affect Iranian EFL learners' grammar knowledge? *International Journal of Humanities and Cultural Studies*, 3(1), 2389–2398.
- Reid, J. M. (1987). The learning style preferences of ESL students. *TESOL Quarterly*, 21(1), 87–111.
- Sadeghi, K., & Ghaderi, F. (2018). Pre-task planning and explicit instruction: Effects on CALF in an oral jigsaw task and gains in linguistic knowledge. *Southern African Linguistics and Applied Language Studies*, 36(4), 365–378. <https://doi.org/10.2989/16073614.2018.1548298>
- Sanz, C., & Morgan-Short, K. (2004). Positive evidence versus explicit rule presentation and explicit negative feedback: A computer-assisted study. *Language Learning*, 54(1), 35–78. <https://doi.org/10.1111/j.1467-9922.2004.00248.x>
- Santamaria, K. D. (2007). *Making form-meaning connections: The Influence of instruction and working memory on L2 clitic acquisition*. Doctoral dissertation, Florida State University, College of Arts and Sciences.
- Schmidt, R. (2001). Attention. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 3–32). Cambridge University Press.
- VanPatten, B. (1996). *Input processing and grammar instruction: Theory and research*. Ablex.

- VanPatten, B. (2002). Processing instruction: An update. *Language Learning*, 52(4), 755–803. <https://doi.org/10.1111/1467-9922.00203>
- VanPatten, B. (2003). *From input to output: A teacher's guide to second language acquisition*. McGraw-Hill.
- VanPatten, B. (2004). Input processing in SLA. In B. VanPatten (Ed.), *Processing instruction: Theory, research and commentary* (pp. 5–32). Lawrence Erlbaum.
- Van Patten, B. (2007). Input processing in adult second language acquisition. In B. VanPatten & J. Williams (Eds.), *Theories in second language acquisition* (pp. 115–135). Lawrence Erlbaum.
- VanPatten, B. (2015). Input processing in adult SLA. In B. VanPatten & J. Williams (Eds.), *Theories in second language acquisition* (2nd ed., pp. 113–135). Routledge.
- VanPatten, B. (2018). Processing instruction: Framing the issue. <https://doi.org/10.1002/9781118784235.eelt0094>.
- Vanpatten, B., Collopy, E., Price, J., Borst, S., & Qualin, A. (2013). Explicit information, grammatical sensitivity, and the first-noun principle: A cross-linguistic study in processing instruction. *The Modern Language Journal*, 97(2), 506–527. <https://doi.org/10.1111/j.1540-4781.2013.12007x>
- VanPatten, B., & Oikkenon, S. (1996). Explanation versus structured input in processing instruction. *Studies in Second Language Acquisition*, 18(4), 495–510. <https://doi.org/10.1017/S0272263100015394>
- Weda, S., & Sakti, A. E. F. (2018). Formal instruction and its effects on the acquisition of English affricate consonants. *International Journal of Academic Research in Progressive Education and Development*, 7(3), 1–13. <https://doi.org/10.6007/IJARPEd/v7-i3/4208>
- Wong, W. (2004). Processing instruction in French: The roles of explicit information and structured input. In B. VanPatten (Ed.), *Processing instruction: Theory, research and commentary* (pp. 187–205). Lawrence Erlbaum.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Mastaneh Haghani is an assistant professor of Applied Linguistics in the faculty of Foreign Languages of Islamic Azad University, North Tehran Branch. She has taught several courses at BA and MA levels. She has published articles and books related to her field of study. Her areas of research interest include teaching grammar and writing to EFL learners, English for Specific Purposes, and methods of language teaching.

Mojgan Rashtchi is an associate professor of Applied Linguistics in the faculty of Foreign Languages of Islamic Azad University, North Tehran Branch. She has taught a variety of courses related to English language teaching to students at different levels. She has published several articles and books and has participated in several local and international conferences. Her primary areas of interest include English language teaching methodology, theories of first and second language acquisition, teaching language skills, and research in education.

Submit your manuscript to a SpringerOpen[®] journal and benefit from:

- Convenient online submission
- Rigorous peer review
- Open access: articles freely available online
- High visibility within the field
- Retaining the copyright to your article

Submit your next manuscript at ► [springeropen.com](https://www.springeropen.com)
