Input processing and grammar acquisition:
Evidence from EFL learners of varying proficiency levels

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Abstract

Although processing instruction (PI) has been a very popular grammar teaching method over the last years, there are, however, very limited if any attempts to explore different proficiency learners' achievements using this approach. This study was, therefore, an attempt to investigate the role of PI in possibly bringing about enhanced acquisition of three grammatical structures: regular past tense, causatives and relative clauses. In addition, it sought learner's attitudes towards PI as it is believed that the success of an approach is highly dependent upon the viewpoints of its practitioners and the students being exposed to it. Three proficiency groups of elementary (n = 42), intermediate (n = 38) and advanced (n = 40) EFL learners were compared. The results of a set of independent samples t-tests revealed significant effects for the use of PI in all the groups except for a lack of improvement for elementary learners' production of the regular past tense structure. The analysis of the attitude questionnaire and learners' further ideas on the effectiveness of PI revealed their appreciation of the integration of this instructional practice in their target language courses. The results are discussed in relation to effective grammar and writing pedagogy.

Introduction

Input processing (IP) can be a psycho-linguistic process centrally related to how L2 learners originally view and process linguistic clue in the language they hear or check. Psychological perspectives on input and IP have been observed from a data processing perspective. Central to this assumption is the notion of the brain as a basic and limited data processor. Jusczyk and Klein (2014) argue that our brain can only process a really limited amount of data. This is usually due to the compromise of contents including a part of working memory, the ability to approach stored clue, and the ability to pay attention. During the 1990s, the information processing assumption that was related to second language acquisition as the IP hypothesis (McLaughlin, 1987; VanPatten, 1990) was inherent which is classified in the learning model of VanPatten (1996) (see Figure 1).

VanPatten (1996) contend that L2 learners can process a very finite amount of the input language they are resolved to. This ability barrier is related to learner processing barriers (Process I) and processing problems. The extent of input that is fortuitously processed is called input, which refers to the learner's approach and processing of the input through their internal processor. The second arrangement of VanPatten's SLA Model (Process II) includes several processes for integrating receptivity into the creative framework. These processes are called "modification" and "reconstruction", where modification refers to an individual's combination of a form or design into an interlanguage system after they have extracted the figure knowledge or structure with a particular meaning in the first stage, i.e. reconstruction. On the other hand, reconstruction refers to the processes by which language learners substitute prior techniques with new strategies in place of doing the same processes more rapidly since they get more proficient (O'Malley & Chamot, 1990).

Hence, the conceptual framework of (PI) is predicated on our comprehension of how individuals engage with the information they are exposed to. We are, thus, concerned with the way learners make sense of what they hear or read and how they understand grammatical structure from input (Wong, 2005). This type of instruction tends to push learners to recognize the grammar in the input.
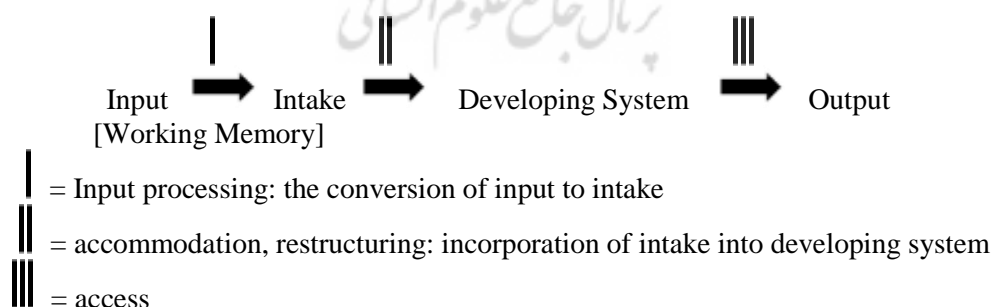
Input $\Longrightarrow$ Intake $\Longrightarrow$ Developing System $\Longrightarrow$ Output
[Working Memory]

| = Input processing: the conversion of input to intake

|| = accommodation, restructuring: incorporation of intake into developing system

||| = access

Figure 1. *Three sets of processes in second language acquisition (Adopted from VanPatten, 1996, p. 3).*

Despite the existence of several empirical studies assessing the postulates of processing instruction (PI) in the context of second language acquisition, there is evidence showing that processing of input alone cannot be regarded as a full explanation for language acquisition. From among the influential factors, one can note the importance of learners' level of

proficiency in either facilitating or hampering their attention to the form and whether different proficiency level learners appreciate the application of this approach in their classrooms. These two factors have received little attention in the PI literature, a gap the present study aims at shedding some light into.

Processing Instruction in Practice

In SLA field, there is, indeed, no lack of research on the effect of different grammar instruction types including processing instruction (e.g., Benati, 2016; Farley, 2004; Rossomondo, 2007; Santamaria et al., 2013; VanPatten, 2015a, 2015b; Wong, 2004) and also many experiments have verified the supremacy of PI, an input-based pedagogical technique over traditional instruction (e.g., Benati, 2021; Naami & Sahragard, 2022; Shintani, Li & Ellis, 2013; VanPatten, 2004; VanPatten & Cadierno, 1993).

Santamaria and Fellowship (2013) assisted a study with 30 Spanish as a second language learners without disabilities and two Spanish speakers with aphasia to probe the use of Spanish as a second language programming language guidelines. The results suggest that PI may be useful in extending syntax comprehension in people with aphasia. Evidence suggests that PI is an attractive educational strategy for L2 learners with mishandling strategies.

In an effort to scrutinize the learning context of EFL in Chinese and Greek, Benati (2005) performed a parallel classroom analysis to examine the influence of processing instruction in relation to activities structured input with equal numbers of referential and affective operations for the acquisition of the simple English past. The eventuality show that the PI has a positive effect on the processing and target feature collection.

Lee and Rossomondo (2007) also analyzed learners' processing for future tense verb mode in Spanish decided by person/quantity and text tenses. The results show that learners are mainly working to achieve meaning, not form. This discovery seems to entail a role for PI in focusing learners' scrutiny chiefly on the meaning and then on the form of linguistic features.

At the same time, Ghasemi and Fazilatfar (2014) guided a study to measure the impact of text enhancement (TE) and input processing (IP) as the two brands of processing versus text enhancement to teach the present and the past temperature. Research results show that TE and IP are more compelling than TI; however, TE and IP are not significantly contrasting from each other.

In another study on the Iranian context, Rikhtegar and Gholami (2015) attempted to explore the possible effects of inundation of input before and after the presentation through reading of the simple past of the young EFL learners in Iran. From the results, they inferred that the reason for the similarity of performance between both groups can be the learners' presupposition that they were going to learn grammar.

Similarly, Sarkhosh and Sarboland (2012) investigated the disparate impact of distinct text enhancement pattern on the acquisition of the simple past tense in English. Their application was organized to measure the effects of TE and IP as two categories of processing compared to TI. They conclude that TE formats can be ineffective and that the exchange between them and learners' learning blueprint has a crucial encounter. To obtain the appropriate influence

from these methods, the researchers propose a new processing routine that includes processing instruction tasks and internal input enhancement.

Rong (2022) also examined the effects of using computer-aided PI to teach English reflexives. The findings indicated that the input-based PI effectively improved the participants' ability to both interpret and produce the target forms, as measured against traditional offline tasks. More importantly, the results also suggested that PI was effective as measured against online self-paced psycholinguistic reading tasks.

Al-Shammari and Sahiouni (2023) conducted a study to investigate the impact of using textual enhancement and input processing techniques on the linguistic development of university learners studying English as a foreign language (EFL). The main goal was to assess the effectiveness of these two methods in teaching the passive voice. The study's findings indicated a significant improvement in participant scores on the post-test compared to the pre-test. Moreover, it is noteworthy that both the initial and subsequent empirical groups attained superior scores in comparison to the conventional teaching model, underscoring the efficacy of these two instructional approaches in the domain of grammar education. Additionally, insights gleaned from interviews conducted as part of the study revealed that participants regarded both textual enhancement and input processing as valuable tools for both learning and teaching grammar. In light of these compelling findings, the study strongly advocates for the integration of these techniques into the pedagogical practices of English as a Foreign Language (EFL) educators. Furthermore, curriculum designers are encouraged to contemplate the inclusion of these methods in their curriculum development endeavors.

In another study, Suzuki, Nakata, and Rogers (2023) discussed receptive and semi-productive (as opposed to open, communicative) practice that aims at optimizing second language (L2) input and intake processing mechanisms. A variety of L2 learning activities were categorized as isolated (e.g., deliberate word learning), guided (e.g., processing instruction, guided induction), and contextualized practice (e.g., reading aloud, shadowing, dictation/dictogloss). In order to examine the potential and limits of these practice activities in automatization, the extant body of empirical work were reviewed with a focus on explicit learning mechanisms. Consequently, they highlighted the beneficial roles of deliberate memorization, guided instruction, noticing, hypothesis testing, explicit instruction, reconstruction, imitation, feedback, and monitoring of own performance. they argued that the quantity of practice, as well as timing of practice variables (i.e., repetition, instruction, and feedback), plays a pivotal role in developing robust L2 knowledge and skills.

Additionally, in the year 2023, Benati delivered a comprehensive examination of the characteristics and significance of structured input activities in the realm of second language research and language education. Benati outlined the principal outcomes of legitimate empirical investigations that explored the efficiency of structured input in diverse languages, with various groups of learners, and subsequently offered recommendations for potential research initiatives within this context.

In a separate study, Benati and Chan (2023) explored the potential influence of motivational factors on the positive results achieved through the use of structured input in acquiring English causative passive forms. This investigation expanded upon previous research conducted

within the framework of structured input and sought to assess real-time effects by employing a self-paced reading test, a reliable tool for evaluating language processing. The principal findings derived from this experimental study confirmed the beneficial impact of structured input in enhancing the accurate comprehension of English causative passive forms, both in terms of precision and response time. Notably, groups engaged in structured input activities displayed similar improvements from the pre-test to the post-test, and these advantageous instructional effects persisted over a three-week period. Furthermore, the study indicated that motivation did not exert any influence on the positive outcomes resulting from structured input.

A glance through the existing literature indicates that one of the aims of PI is to teach complex structures through PI-guided activities. However, many studies have made a random selection in the choice of the targeted structure/s. In fact, Van Patten's (2007) theory of PI with a set of structured input activities (a set of activities that may not yield the same learning outcomes for learners with various levels) plays an important role in such an instruction which seems to have been ignored in such relevant studies. Additionally, most trainees are unaware of VanPatten's (1993, 1996, 2002 and 2004) IP model. In addition, structured import operations have definite and fairly complex instructions that must be chased in order to generate them correctly. However, some researchers have marked structured entry activities without seeing the fundamental guidelines recommended by VanPatten (2004, 2007).

Most researchers have considered the role of input and its role in language acquisition; however, very few have taken into account the role of learners in interpreting input. Yet, another shortcoming of studies on PI is the fact that learners' level of proficiency might determine the effectiveness of PI in a different way. So, we cannot assume that such an instruction can be useful for all groups of learners.

The currents study was, thus, an attempt to bridge some of the uncertainties in this area. This research was aimed at exploring the role of PI in different proficiency learners' acquisition of simple to more complex structures in an instructed setting. It stands to reason that the possible effectiveness of a specific language teaching method is highly dependent upon the beliefs and attitudes of the persons involved in using it. Therefore, in order to supplement and strengthen the data regarding learners' development in grammar acquisition, their attitudes towards this approach including the positive and negative aspects were also inspected; thus, the following three research questions were, accordingly, posed:

Research Question One: Is there a disparity in the impact of processing instruction versus traditional instruction on the acquisition of linguistic forms and structures?

Research Question Two: Do different proficiency level learners benefit differently from PI instruction in learning forms and structures?

Research Question Three: How do learners perceive processing instruction?

Method

1. Participants

The current investigation was carried out with 120 female participants for whom English was a foreign language learned in instructed settings. The mean age was 17.5. The participants'

proficiency level measured through a reliable language school's standard placement test, which the participants were taking as part of their learning language (Cronbach's alpha = .78) fell within three categories of elementary (42 out of 51 learners), intermediate (38 out of 47 learners), and advanced (40 out of 45 learners). Participants were randomly assigned to experimental and traditional groups in each proficiency level. Participants' prior knowledge of the target structures was ensured to be similar by means of the pre-tests, namely the interpretation and production tests (see instruments for details). Furthermore, they were found to be of the similar level of proficiency in each group based on their performance in the placement test.

2. Language Proficiency, Pretest Materials

2.1 The Target Linguistic Items

Three English structures were selected in the present study: regular past tense, causatives and relative clauses for the elementary, intermediate, and the advanced group, respectively. The reason for selecting these structures is triple. To begin with of all, these constructions have not been enough examined in past processing instruction research (Benati & Angelovska, 2016). Secondly, these structures test both principles of PI: the past tense and relative clauses are related to the Primacy of Meaning Principle (P1) while the causatives are influenced by the Primary Noun Principle (P2). The third reason for the determination of the structures is that these were listed as the more difficult items to acquire for L2 learners of English according to the teachers' opinions. In addition to teachers' perception, the most reason for the trouble in acquiring the relative clauses is that sentences utilizing these clauses are influenced by another processing rule: the Sentence Location Principle (SLP). When second language (L2) English learners analyze sentences, they must determine the subject, the action, and the object of the action.

2.1.1 Instructional Packet

The materials addressed the three structures of past tense –ed, causatives and relative clauses. Processing instruction procedures that   were used for all the proficiency groups designed to assist second language (L2) learners to process these forms correctly. The material that was designed based on the original PI guidelines (Lee & VanPatten, 1995; VanPatten & Sanz, 1995) had the following characteristics:

1. Presentation of the target linguistic feature attracting participants' attention to possible processing problems through explicit instruction;

2. Employing referential and affective structured input activities in which participants were asked to answer to the content of sentences.

In this examination, 30 structured entry activities were refined for the past tense –ed, 22 for the cause and 30 for the relative clause. Through this exercise, learner's endeavor to elucidate the meaning of grammatical structures within the input. Structured input activities have been developed to encourage second language (L2) learners to concentrate their attention on these structures upon initial exposure. Reference activities require L2 learners to process input information in an endeavor to resolve the exact meaning of a sentence. Participants received no response while performing basic activities.

Affective activities, on the other hand, require members to determine their conclusions or emotional responses based on the instructional content of the input sentences. In this exercise, there are no definitive correct or incorrect responses. The purpose of sentiment exercises is to align learners' attention to linguistic forms while simultaneously requiring them to engage with the content of each sentence to complete the task of agreeing or disagreeing with the opinion that, structured typing exercises include an equal number of reference and influence exercises. There were three groups exposed to traditional instruction for comparison purposes with each of the experimental groups. As with classic PI studies, this study, too, compared the performance of PI groups to a traditional instruction condition which typically involved explicit explanation of grammatical forms followed by traditional output practice.

3. Instruments

In arrange to meet the required targets of the study, a number of instruments clarified underneath were managed. An institutionalized proficiency test, a set of elucidation and generation task adapted in pre and posttests, and a demeanor survey were all used in amid the study.

3.1 The Proficiency Test

An in-house proficiency test was employed in the study to ascertain the homogeneity of participants. The test included a listening comprehension section comprising 20 multiple-choice items, a reading comprehension part with 8 reading passages followed by multiple-choice items, and a language use part where participants were instructed to make a selection the accurate explanation that best fits the blank. This goal of the latter was to assess the grammatical ability of the participants. The aptitude test benefits from a good confidence level ($\alpha = .86$) calculated using Cronbach's alpha.

3.2 Interpretation Task

The interpretive task consists of 20 sentences (10 common present analytic sentences) for the past tense -ed. Twenty sentences with 10 distractions are used for causation and 10 sentences are passed down for relative clauses. Participants were announced to listen to sentences and identify (explain) the accurate sentences according to the targeted structure. To measure comprehension in real time, we did not rerun the interpretation task. The score for the explanatory task follows a dual benchmark, with erroneous answers drawing 0 points and appropriate answers receiving 1 mark. The reliability and validity of the explanatory tasks (test before, immediately-- and after the delay) were found to be acceptable ($\alpha > 0.62$).

3.3 Written Production Task

The writing construction task measures a participant's capability to outgrowth accurate sentences that include the destination structure. Learners have to attention at 3 pictures for each structure and make sentences for each picture using markup language. The generated exercises follow the same scoring method as in the interpretation (correct form 1 score; incorrect form 0 score). Learners were given sufficient time to monitor and put down their responses. Different production tasks were used for each level of proficiency, each attempting to elicit production of the target structure. Inter-rater reliability of three-way ratings of participants' writing was calculated using Cohen's Kappa test. Kappa results of 0.85, 0.76 and

0.92 indicate that the reviewers provided similar information about elementary, intermediate and advanced students' writing performance, respectively.

3.4 Attitude Questionnaire

A researcher-developed attitude questionnaire elicited participants' perspectives regarding the effectiveness of instructional method. The questionnaire consisted of 8 Likert scale questions with answers from 1 (strongly disagree) to 5 (strongly agree). The questions tapped information about if learners found the instruction as more beneficial and helpful than their regular courses. Lastly, members were inquired to supply explanations about the instruction within the shape of two open-ended items. The questionnaire was tested for its reliability and validity and the results confirmed its acceptable reliability ($\alpha = .73$) and validity (a factor load over 60%).

4. Procedure

This study adopted a pre-test/post-test design. The pre-tests were conducted one week in advance of the initiation of the treatment period. It needs to be noted that at the outset of the study, the learners' proficiency level was determined according to an in-house developed test of proficiency applied by the language institute. The proficiency test included reading comprehension questions and grammar knowledge sections. The treatments took place in three days each lasting for two hours of instruction for each group. During the treatment, all the groups received instruction by the same teacher. The learners within the test groups to begin with were given clear instructions on the salient points of the goal and then included in structured entry exercises. The teacher's role was a facilitator during the experiment. Any feedback from the teacher only showed the accuracy of learners' responses without any additional feedback. The traditional group learners did not receive any PI instruction; rather, they were provided with both mechanical and meaningful activities necessitating the use of the target structure makes sense without raising any awareness about the target structure. Post-tests were used once immediately after instruction and once three weeks after the instructional period. All participants were instructed to commence with sentence-level interpretation tasks, subsequently proceeding to sentence-level production tasks.

Results

1 PI vs. TI: Elementary Group

The data were collected through interpretation tasks which, as already mentioned, required learners to listen to the sentences and identify (explain) correct sentences based on the targeted structure. As mentioned earlier, for the elementary level participants, the target structure was the regular past tense –ed form.

2 Interpretation Task Results

The t-test results in the pre-test stage indicated no statistically significant (t (38) = .415, p = .68) distinctions between PI and TI groups' means in terms of interpretation of the target structure before instruction was initiated. This means that the groups were homogenous at the outset of the study and the researcher could initiate the treatment.

Descriptive statistics relating to the performance of the elementary learners at three stages of data collection are presented in Table 1.

Table 1. *Descriptive Statistics for Groups' Interpretation Performance across Time: Pretest, Immediate and Delayed post test*

Variable	N	Pre-test		Immediate Post-test		Delayed post-test	
		Mean	SD	Mean	SD	Mean	SD
TI	20	2.45	1.27	3.10	1.37	2.85	1.22
PI	22	2.60	.99	4.70	1.49	3.80	1.47

The results clearly point to the supremacy of the PI groups recording the progress of learners from the pre-test (M = 2.60, SD = .99) to the post-test (M = 4.70, SD = 1.49) and delayed post-test (M = 3.80, SD = 1.47). The mean scores for TI, however, did not show considerable variations. The data were subjected to independent samples t-test for more accurate results which is presented in tables 2 and 3.

Table 2. *T-test Results for Elementary Learners' Interpretation Task Performance (Immediate Post-test)*

		Levene's Test for Equality of Variances			t-test for Equality of Means					95% Confidence Interval of the Difference	
		Sig.	F	Df	t	Mean Difference	Sig. (2-tailed)	Std. Error Difference		Upper	Lower
Posttest	Equal Variances not Assumed	-	-	37.746	3.532	1.60000	0.001	0.45306		2.51737	0.68263
	Equal Variances Assumed	0.879	0.023	40	3.532	1.60000	0.001	0.45306		2.51717	0.68283

Table 3. *T-test Results for Elementary Learners' Interpretation Task Performance (Delayed Post-test)*

		Levene's Test for Equality of Variances			t-test for Equality of Means				95% Confidence Interval of the Difference	
		Sig.	F	Df	t	Mean Difference	Sig. (2-tailed)	Std. Error Difference	Upper	Lower
Delayed	Equal variances not assumed	-	-	36.790	2.217	0.95000	0.033	0.42843	1.81825	0.08175
	Equal variances assumed	0.203	1.675	40	2.217	0.95000	0.033	0.42843	1.81731	0.08269

The findings indicated a significant impact of instructional intervention on both delayed post-test (t (40) = .203, p = .033) and immediate post-test (t (40) = 3.53, p = .001). These outcomes align with expressive insights revealing a prevalence of Processing Instruction (PI) (M = 4.70, SD = 1.49) over Traditional Instruction (TI) (M = 3.10, SD = 1.37) in both delayed and immediate post-tests (PI (M = 3.80, SD = 1.47), TI (M = 2.85, SD = 1.22)). The t-test results unequivocally establish the efficacy of processing instruction in enhancing comprehension of past tense –ed among foundational English as a Foreign Language (EFL) learners, both in the short term and the long term.

3 Written Production Task Results

For the written production tasks, learners were inquired to glance at 3 pictures for each structure and to create a sentence corresponding to each of the pictures utilizing the linguistic point given. The grammatical structure for the written production task at the elementary level was the regular past tense –ed form. The pre-test scores for the composed production assignment uncovered no noteworthy contrasts between PI and TI means before the instructional intervention (t (40) = .549, p = .45). As regards the performance of the participants in the post test stage, the means shown in Table 4 indicated that only the PI group made some progress from pre-test to post-test.

Table 4. *Descriptive Statistics for Elementary Groups' Production Performance across Time: pretest, Immediate and Delayed post test*

Variable	N	Pre-test Mean	Pre-test SD	Immediate Post-test Mean	Immediate Post-test SD	Delayed post-test Mean	Delayed post-test SD
TI	20	2.15	1.13	2.80	1.36	2.45	1.14
PI	22	2.45	1.35	3.40	1.35	2.70	1.12

Table 5. *T-test Results for Elementary Learners' Production Task Performance (Post-test)*

		Levene's Test for Equality of Variances Sig.	F	t-test for Equality of Means df	t	Mean Difference	Sig. (2-tailed)	Std. Error Difference	95% Confidence Interval of the Difference Upper	95% Confidence Interval of the Difference Lower
Posttest	Equal variances assumed	0.798	0.066	40	1.398	0.60000	0.170	0.42920	1.46886	-.26886
	Equal variances not assumed	-	-	37.999	1.398	0.60000	0.170	0.42920	1.46887	-.26887

Table 6. *T-test Results for Elementary Learners' Production Task Performance (Delayed post-test)*

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | 95% Confidence Interval of the Difference | |
		Sig.	F	df	t	Mean Difference	Sig. (2-tailed)	Std. Error Difference		Upper	Lower
Delayed	Equal variances not assumed	.944	.005	40	.695	.25000	.491	.35964		.97806	-.47806
	Equal variances assumed	-	-	37.991	.695	.25000	.491	.35964		.97806	-.47806

The outcomes derived from the independent samples t-test, as presented in Tables 5 and 6, revealed a lack of statistical significance in the impact of instruction for both delayed post-test (t (40) = .695, p = .49) and immediate post-test (t (40) = 1.39, p = .17). This finding is in line with descriptive statistics indicating subtle distinctions between Traditional Instruction (TI) (M = 2.80, SD = 1.36) and Processing Instruction (PI) (M = 3.40, SD = 1.35) in both the delayed and immediate post-tests (PI (M = 2.70, SD = 1.12), TI (M = 2.45, SD = 1.14)).

The overhead measurable examination shows the predominance of PI over TI within the elucidation of the past-tense -ed among rudimentary learners, whereas these two bunches did not consider to be distinctive with respect to the production assignment.

4 PI vs. TI: Intermediate Group

For the intermediate learners, too, an interpretation task was used where the participants were required to listen to 20 sentences and identify the causative structures.

4.1 Interpretation Task Results

Similar to the elementary groups, the t-test results in the pre-test stage indicated no significant (t (36) = 1.29, p = .20) differences between PI and TI groups' means before instruction was initiated. In order to examine the intermediate level groups' performance in the interpretation and production of English causatives, a set of independent samples t-tests were run. First, the results of descriptive statistics are shown in Table 7.

Table 7. *Descriptive Statistics for Intermediate Groups' Interpretation Performance across Time: Pretest, Immediate and Delayed post tests*

| | | Pre-test | | immediate Post-test | | delayed post-test | |
Variable	N	Mean	SD	Mean	SD	Mean	SD
TI	18	2.55	1.31	5.75	1.51	4.05	1.90
PI	20	3.10	1.37	6.95	1.35	5.35	1.53

As the mean and standard deviation scores in Table 7 show, PI could lead to a comparatively higher performance compared to TI in both the immediate post-test (M = 6.95, SD = 5.75) and delayed post-test (M = 5.35, SD = 4.05). More accurate and reliable results were obtained through independent samples t-test, the results of which are displayed in Table, 8 and 9.

Table 8. *T-test Results for Intermediate Learners' Interpretation Task Performance (Immediate Post-test)*

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
		Sig.	F	df	t	Mean Difference	Sig. (2-tailed)	Std. Error Difference	Upper	Lower
posttest	Equal variances not assumed	-	-	37.531	2.637	1.20000	.012	.45509	2.12166	.27834
	Equal variances assumed	.690	.162	36	2.637	1.20000	.012	.45509	2.12128	.27872

Table 9. *T-test Results for Intermediate Learners' Interpretation Task Performance (Delayed post-test)*

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Delayed	Equal variances not assumed	-	-	2.379	36.321	.023	1.30000	.54652	.19195	2.40805
	Equal variances assumed	1.529	.224	2.379	36	.023	1.30000	.54652	.19363	2.40637

The findings indicate a non-significant distinction between the Processing Instruction (PI) and Traditional Instruction (TI) groups in the pre-test (t (36) = 1.29, p > 0.05), thereby affirming the homogeneity of the participants. However, notable differences emerge in the

independent samples t-tests for both the immediate post-test (t (36) = 2.63, p = 0.01) and delayed post-test (t (36) = 2.37, p = 0.02). These outcomes align with descriptive statistics, underscoring the superior performance of the PI group in both the immediate and delayed post-tests.

4.2 Written production task results

The written production data for the intermediate group was elicited by means of presenting three pictures to the learners and asking them to write about the pictures. Participants had to use causatives to complete the task. The pre-test scores for the composed production errand in Table 11 uncovered no noteworthy contrasts between PI and TI group's means before the instructional intervention (t (36) = -.35, p = .72). In order to evaluate the intermediate group learners' productive ability in the use of English causative, a series of independent samples t-tests were conducted. First, the results of descriptive statistics are reported in Table 10.

Table 10. *Descriptive Statistics for Intermediate Groups' Production Performance across Time: Pre-test, Immediate and Delayed post test*

		Pre-test		Post-test		Delayed post-test	
Variable	**N**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
TI	18	2.80	1.39	2.85	1.38	2.45	1.19
PI	20	2.65	1.30	4.25	1.86	3.55	1.79

According to Table 10, although the PI and TI groups had close mean scores in their pre-test, they showed mean difference in both immediate and delayed post-tests. More specifically, the PI group achieved a higher mean score in the immediate post-test (M = 4.25, SD = 1.86) and delayed post-test (M = 3.55, SD = 1.79). In an attempt to compare the groups by means of inferential statistics, a number of t-tests were run, the results of which are displayed in Tables, 11, and 12.

Table 11. *Results for Intermediate Learners' Production Task Performance (Post-test)*

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		Sig.	F	df	t	Mean Difference	Sig. (2-tailed)	Std. Error Difference	Upper	Lower
Posttest	Equal variance	-	-	35.137	2.698	1.40000	.011	.51886	2.45318	.34682
	Equal variance	.147	2.187	36	2.698	1.40000	.010	.51886	2.45037	.34963

Table 12. *Results for Intermediate Learners' Production Task Performance (Delayed post-test)*

		Levene's Test for Equality of Variances			t-test for Equality of Means					95% Confidence Interval of the Difference	
		Sig.	F	df	T	Mean Difference	Sig. (2-tailed)	Std. Error Difference		Upper	Lower
Delayed	Equal variances not	-	-	33.054	2.287	1.10000	.029	.48095		2.07844	.12156
	Equal variances	.034	4.866	36	2.287	1.10000	.028	.48095		2.07364	.12636

The results corroborate those of the interpretation task, showing no significant difference for pre-test between the groups (t (36) = -0.35, p= .78) but a significant difference for immediate post-test (t (36) = 2.69, p= .01) and delayed post-test (t (36) = 2.28, p = .02). Therefore, it can be deduced that the PI had a positive influence upon the learners' both interpretation and production of English causative. The results are specifically important since they show the duration of the treatment effect which has lasted until the delayed post-test.

4.3 PI vs. TI: Advanced Group

For advanced group, the data were collected through interpretation tasks which required learners to listen to the sentences and pinpoint (interpret) the correct 'relative clause' structure.

4.4 Interpretation Task Results

We used the same procedures to ensure the homogeneity (t (38) =.69, p = .49) of the participants before the treatment. In an attempt to evaluate the advanced groups' performance in the interpretation and production of English relative clauses, another series of independent sample t-tests were run. First, the results of descriptive statistics are shown in Table 13.

Table 13. *Descriptive Statistics for Advanced Groups' Interpretation Performance across Time*

		Pre-test		Immediate Post-test		Delayed post-test	
Variable	**N**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
TI	20	2.65	1.38	4.55	2.16	4.30	1.86
PI	20	2.95	1.35	5.90	1.65	4.60	1.46

Table 13 reveals that Processing Instruction (PI) yielded a notably higher performance compared to Traditional Instruction (TI) in the immediate post-test (M = 5.90, SD = 1.65). Conversely, for the delayed post-test, the mean difference between PI (M = 4.60, SD = 1.46) and TI (M = 4.30, SD = 1.86) was subtle. To ensure precision and reliability in the analysis, independent samples t-tests were conducted, and the outcomes are presented in Tables 14 and 15.

Table 14. *T-test Results for Advanced Learners' Interpretation Task Performance (Post-test)*

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
		Sig.	F	df	t	Mean Difference	Sig. (2-tailed)	Std. Error Difference	Upper	Lower
	Equal variances not assumed	-	-	35.525	2.218	1.35000	.033	.60860	2.58487	.11513
posttest	Equal variances assumed	.271	1.246	38	2.218	1.35000	.033	.60860	2.58205	.11795

Table 15. *T-test Results for Advanced Learners' Interpretation Task Performance (Delayed post-test)*

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
		Sig.	F	df	t	Mean Difference	Sig. (2-tailed)	Std. Error Difference	Upper	Lower
	Equal variances not assumed	-	-	35.973	.565	.30000	.575	.53064	1.37622	-.77622
Delayed	Equal variances assumed	.230	1.487	38	.565	.30000	.575	.53064	1.37422	-.77422

The results show an insignificant difference between PI and TI in the pre-test (t (38) = .69, p= .49), endorsing the homogeneity of the participants in their grammatical knowledge. Although the results of independent samples t-test for the immediate post-test (t (38) = 2.21, p= 0.03) show significant differences, the results are not significant for the delayed post-test (t (38) = .56, p= .57). The results of the independent samples t-test are in line with those of descriptive statistics pointing to the superiority of the PI group over the TI group in the immediate post-test but not in the delayed pos-test.

4.5 Written production task results

The written production data for the advanced group was elicited by means of presenting three pictures to the learners and asking them to write about the pictures. Participants had to use relative clauses to complete the task. Similar to the other groups, independent samples t-tests (see Tables 17 and 18) were conducted to test the researchers' assumptions.

Table 16. *Descriptive Statistics for Advanced Groups' Production Performance across Time: Pre-test, Immediate and Delayed post test*

Variable	N	Pre-test		Immediate Post-test		Delayed post-test	
		Mean	SD	Mean	SD	Mean	SD
TI	20	2.50	1.35	4.35	2.23	3.30	1.78
PI	29	3.05	1.14	5.90	2.35	4.80	2.04

According to Table 16, although the PI and TI groups had close mean scores in their pre-test, they showed mean difference as in both immediate and delayed post-tests. More specifically, the PI group achieved a higher mean score in the immediate post-test (M = 5.90, SD = 2.35) and delayed post-test (M = 4.80, SD = 2.04).

Table 17. *T-test Results for Advanced Learners' Production Task Performance (Post-test)*

		Levene's Test for Equality of Variances			t-test for Equality of Means					95% Confidence Interval of the Difference	
		Sig.	F	df	t	Mean Difference	Sig. (2-tailed)	Std. Error Difference		Upper	Lower
Posttest	Equal variances not assumed	-	-	37.881	2.135	1.55000	.039	.72611		3.02009	.07991
	Equal variances assumed	.561	.345	38	2.135	1.55000	.039	.72611		3.01993	.08007

Table 18. *T-test Results for Advanced Learners' Production Task Performance (Delayed post-test)*

		Levene's Test for Equality of Variances			t-test for Equality of Means					95% Confidence Interval of the Difference	
		Sig.	F	df	t	Mean Difference	Sig. (2-tailed)	Std. Error Difference		Upper	Lower
Delayed	Equal variances not assumed	-	-	37.307	2.477	1.50000	.018	.60567		2.72687	.27313
	Equal variances assumed	.958	.003	38	2.477	1.50000	.018	.60567		2.72612	.27388

The findings reveal that there is no substantial disparity in the pre-test scores between the groups (t (38) = 1.38, p= .17) but a significant difference and a positive influence upon the learners' immediate interpretation and their both immediate and delayed production of English relative clause both in the immediate (t (38) = 2.13, p= .03) and delayed post-test (t (38) = 2.47, p = .01).

4.6 Attitude toward PI

It should be noted that the importance of one approach or another may be partly related to the function of the peculiarities inherent in a particular pedagogical framework as well as the learner's recognition of it. In this way, to better understand the viability of PI, members were asked to complete a behavioral survey with 8 Likert scale items and 2 open-ended questions. The survey results are presented in Figures 2, 3 and 4 for each group.
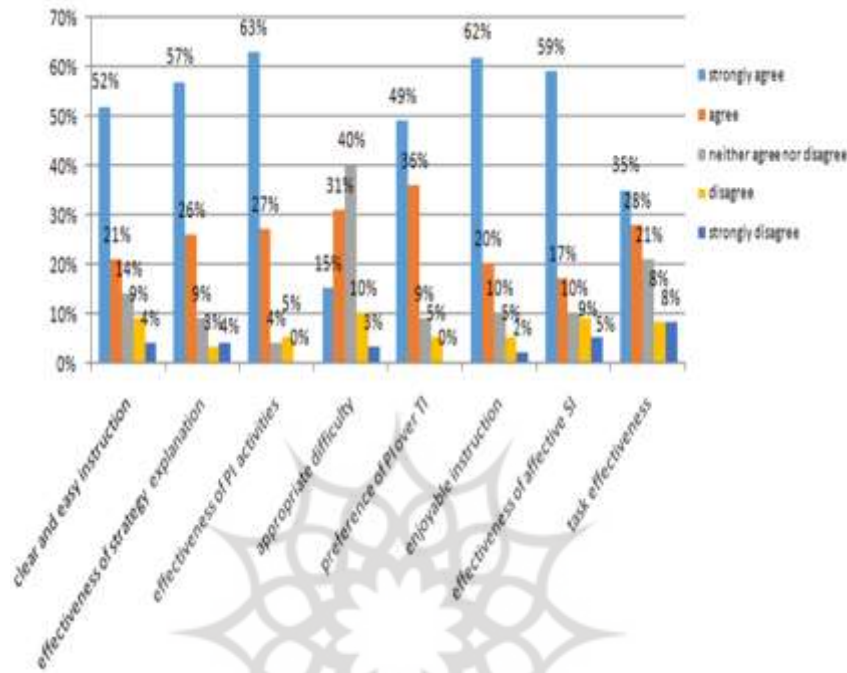
Figure 2. *Attitude towards PI: for elementary group*
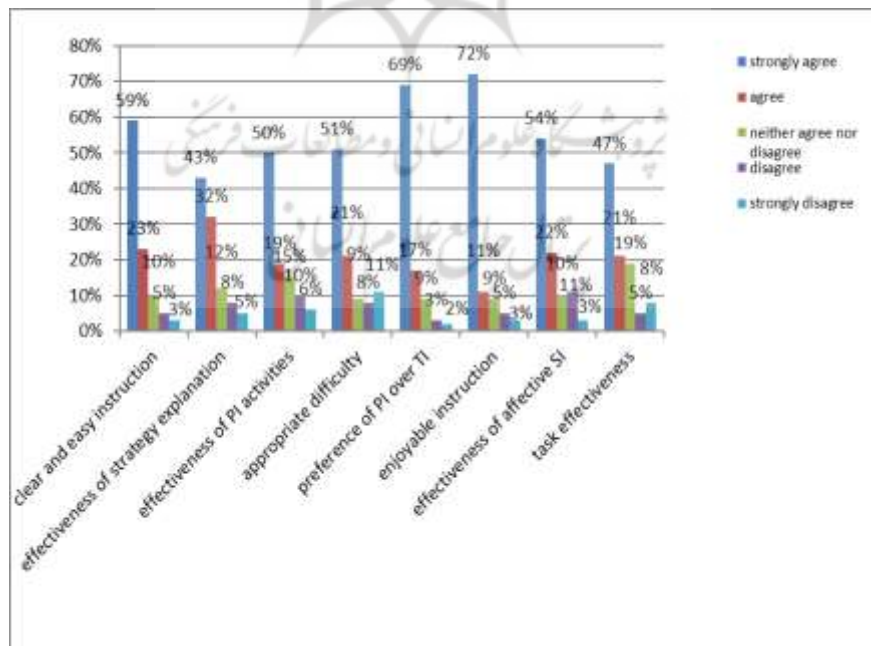
Figure 3. *Attitude results for intermediate group*
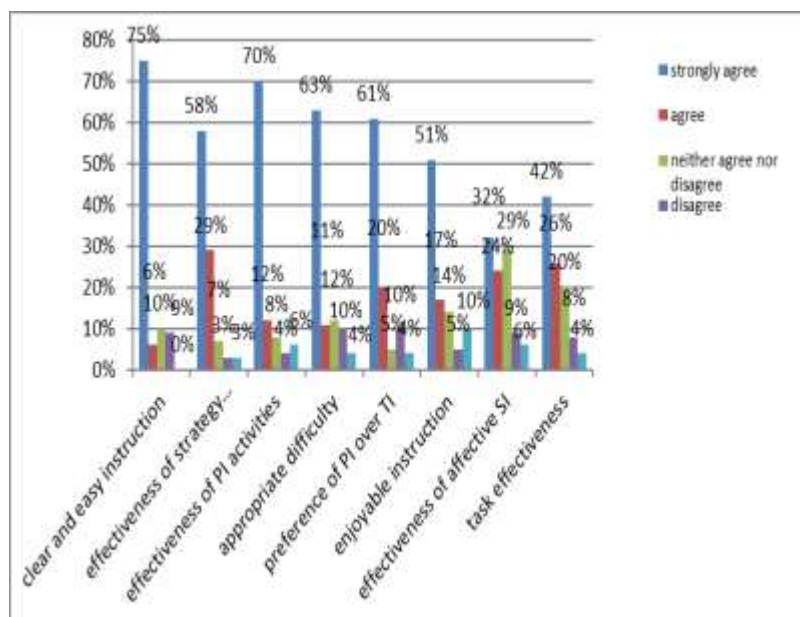
Figure 4. *Attitude results for advanced group*

Given that explicit grammar teaching prevails in the Iranian environment, limited number of language lessons, and limited presentation outside the classroom, the transition from regular explicit instruction to therapeutic teaching seems as inevitable. Affirming this, the members' extremely positive attitudes towards their engagement with PI exhibit the suitability of this type of instruction for elementary, intermediate, and advanced language learners. More particularly, more than half of the rudimentary (52%), intermediate (59%) and progressed (75%) members unequivocally concurred with the PI instruction.

The convenience of clarifications about inaccurate strategies was recognized by elementary (57%), intermediate (43%) and progressed (58%) members. Importantly, the effectiveness of PI activities was accepted by elementary (63%), intermediate (50%) and advanced (70%) learners. Moreover, PI was deemed to provide an enjoyable grammar learning experience according to elementary (62%), intermediate (72%) and advanced (51%) learners. Furthermore, a useful role of affectively structured input activities has been revealed in linking goal structure learning to elementary (59%) and intermediate (54%) learners' real-life experiences. On the other hand, only 32 percent of advanced level learners considered the tasks as related to their real life. This might be because of the level of the proficiency since advanced learners already had the experience of reading authentic materials in their learning experience, therefore, the grammar exercises could have been seen not related to their life.

In terms of task effectiveness, basic learners were not apparently oriented toward task effectiveness, i.e., the use of clarifications and written productive activities. Once the impact of a measurable test is revealed, PI learners cannot outperform their IT peers in creating a goal structure. This is often confirmed in surveys as the difficulty of the quest is a matter of controversy.

The results of the open-ended research part of the study showed that some members were not proficient in making perfect use of the new structure learned in the article. For example, a practitioner said, "I understand but I can't compose it. Shame on me". Some other students

made comparative comments showing the waste in writing practice of elementary students. This trend is mimicked by the fact that learners are more inclined towards PI than TI as about half (49%) of members agree with PI, which may be due to the difficulty of production tasks for learners.

Intermediate and advanced learners, on the other hand, welcomed the easy instruction and the effectiveness of PI over TI. For instance, an intermediate learner added: "I like this teaching because I can know my problems and then teacher helps me do some exercises to learn grammar". This statement apparently refers to the role of explicit instruction in clarifying the grammatical feature and the problematic strategies applied by the learners followed by the popularity of the input structured activities where learners are given the chance to practice the structure. Interestingly, an advanced learner appreciated the PI instruction stating that "I always had problems in relative clauses and I think they are very difficult. But now I believe I can use them very well and I know them well now". It is assumed that PI could be tailored to each level learners' needs and difficulties by presenting a comprehensive and complete instructional and practice kit meeting the challenges and problems faced by the learners.

On the whole, the results of survey items pinpoint the effectiveness of PI over TI in bringing about positive comprehension and production results. More significantly participants in this study welcomed the integration of this instructional practice in their target language courses.

Discussion

Given that there are impediments within the processing instruction investigate base (Benati, 2016; Cheng, 2004; Lee, 2015) the fundamental and objective of the present study was to contrast the impacts of processing instruction and conventional instruction acquisition of the past tense –ed, relative clause and causative structures of learners across varying levels of proficiency. Our assumption was that learners' level of proficiency might determine the effectiveness of PI in a different way.

An additional aim was to look at the conceivable impacts of processing instruction intervention on learners' capability to decipher sentence and create sentences containing the previously mentioned forms. In order to address the investigate questions of this study, two classroom practices for each structure were conducted. In general, the results given the following new prove from elementary (i.e., past tense –ed), intermediate (causatives) and progressed (relative clauses) learners on the adequacy of processing instruction:

One proves is that all EFL Learners at the Proficiency Level Discovered in the Processing Manual have enhanced their capacity to decipher sentences including past tense, causative verbs and relative clauses in English. This implies that PI with clear instructions and organized typing exercises is possible to direct the learners' focus towards choosing the right form of language with a level of proficiency and understanding. Their commons are changing.

In addition, although intermediate and advanced EFL learners who received processing instructions successfully used the targeted features in their product, the beginner level participants did not exhibit any enhancements in their proficiency in employing past tense forms in their assignments. This demonstrates that the rudimentary learners' ability to be useful

has been so limited that they do not seem to have incorporated an attentive structure into their product.

Furthermore, beginner and intermediate English learners in Iran who processing instruction have consistently exhibited superior performance over time compared to their counterparts in traditional instruction when interpreting sentences involving the past tense and causative verbs. Only advanced learners were found to be not significantly different from their TI peers in late interpretation of relative propositions. This means that PI is an effective pedagogy because it helps relatively lower-level learners make the formal meaningful connections deemed necessary for acquisition.

Overall, the results from the PI and TI groups confirmed the researchers' forecast that learners disclosed to processing instructions appeared to advance in their capability to interpret sentences. The results demonstrate that processing instruction has the ability to regulate how L2 learners of the English language analyze sentences containing linguistic structures. This is consistent with previous studies (e.g., Lee & Benati, 2007a; 2007b) that questioned the effectiveness of advanced structural input exercises using the past tense in Japanese. The eventuality of these modules shows that arranging structured inputs alternates unnecessary processing strategies of L2 learners and helps learners to properly appreciate Japan's past.

A later study by Benati and Angelovska (2016) also demonstrated a valuable function of PI in establishing better performance in associations of formal importance. Despite the fact that both young and adult members performed better on interpreting tasks, the latter group performed better than younger practitioners in their production tasks, a finding. Currently, Benati et al. related to the cognitive task stack. It seems that, according to Benati et al. different cognitive and constructive stages in second language development, as reflected in the learner's general abilities, which can vary depending on the subject matter to which the learner pays attention to structures goals, especially when homework (e.g., production) is more cognitively demanding.

The present study includes unused empirical evidence for the idea that processing instructions influence not only semantic strategy (past) but also procedural syntactic structure and the regional principle of the sentence and the principle of the primacy of meaning are associated with the relative proposition test. Therefore, the processing instruction has an influence on the development system of the L2 learner. Another new proof is that the processing guide is an effective guide not only for beginner L2 English learners but also for intermediate and advanced English learners. However, it should be noted here the lack of capacity of PIs to improve baseline learner outcomes. Then, despite the fact that the processing instruction is reliable for speeding up processing, it is conceivable that it does not lead to any accuracy rate in the output for the rudimentary learner.

The results of the current study cancel out the evidence from previous investigations that hypothesized a positive effect on PI at the production and conversation levels (VanPatten & Sanz, 1995; Benati, 2001; Benati & Angelovska, 2016; Cheng 2002, 2004; Izumi 2002; Melody & Suh 2009). The compound and word formation tasks in these studies were refined in the work of VanPatten and Sanz (1995). In the realm of educational research, Benati (2001) pioneered the creation of a discourse-level production task, while Cheng (2002, 2004)

established an assisted composition writing task. The synthesis of findings from these four investigations demonstrates the effectiveness of learner-assisted instructional methods in rectifying improper cognitive processing mechanisms, even when applied to less structured tasks. This approach also enhances control over speech-level production tasks.

In previous studies, VanPatten and Cadierno (1993), VanPatten and Oikkenon (1996), VanPatten and Fernández (2004), Morgan-Short and Bowden (2006), as well as VanPatten, Incclezan, Salazar, and Farly (2009), have primarily focused their investigations on the influence of processing instructions on syntactic procedures pertaining specifically to the nominal first principle (P2). All participants in these studies employed direct pronouns in the context of Spanish data assembly. The comprehensive findings from these inquiries collectively demonstrate that the implementation of processing instructions significantly aids second language (L2) learners in accurately navigating the use of direct pronouns in Spanish. In a related study conducted by VanPatten and Wong (2004), the research was initiated to explore the impact of processing instructions on syntactic strategies in the realm of French causation. The outcomes of this investigation reveal that the utilization of processing instructions effectively modified the nominal first principle (P2) employed by learners when addressing French causation.

Previous subjects have shown that processing instruction is an attractive pedagogical mediator to aid learners grappling with nominal first principles (P2) in several prominent languages (direct pronouns) and several languages (Spanish and French). The current study further questioned the impact of nominal first-principles (P2) processing instructions in the case of causal constructs. Farsi is typographically classified as an SOV language and an important fact respecting Farsi word order is that the verb must be the consequence of a sentence (Abrahams, 2005).

The favorable outcomes observed in the present study provide compelling evidence for the significance of this approach in the instruction of language structure, specifically through the modification of the use of the "first name principle" (P2) among Iranian learners at the L2 level. Lee (2004) postulates that processing instruction can assist learners of any second language in developing appropriate strategies for word order processing. The results of the current study confirm this hypothesis and are believed to cast a new linguistic element (relational clause) to the index.

Processing instruction assisted applicants in this examination process relative clauses in English, as participants in this band originally enhanced their conduct after processing. The finding that PI did not differ from TI in the delayed interpretation task should not be regarded as PI's incapability in attracting learners' attention to form since learners were superior in production task far harder than the interpretation task. The only explanation for this non-significance might be TI learners' recognition of the relative clauses and their proper form based on their level of proficiency.

However, as the results of production test confirm, learners even at the advanced level need instruction to process and retain the linguistic structures in their repertoire. Having a sentence within a sentence leads to problems for Iranian learners since relative clauses are distinct from simple sentences with respect to consisting of a clause within the main sentence (Yousef &

Torabi, 2012). Therefore, a processing problem associated with relative clauses is related to VanPatten's Sentence Location Principle (2007). Based on this principle, learners consider components in the beginning of sentences easier to parse compared to those in the medial or final locations.

It was a concern in the present study that learners needed to analyze elements in medial location to be able to determine the type of relative clauses and to employ the appropriate relative pronoun. It is crucial not to limit oneself to processing the initial sentence position, should the goal be understanding the correct relative pronoun that should be used, since the beginning position usually comprises the antecedent, which would not always signal about the relative pronoun to be used (Song & Suh, 2009). Consequently, learners had to process items in medial and final sentence positions in order to make appropriate interpretations. This goal was achieved within the current investigation, through the utilization of structured input activities and the explicit instruction which assisted learners to notice the proper interpretations.

The consequences highlight the conception of conscious scrutiny by Schmidt (1994) and VanPatten (1996) – "attention" – for the linguistic constructs of the input language, which they contemplate an essential prerequisite. To acquire a second language. The observation hypothesis (Schmidt, 1994) nominates that conscious "recognition" of specific L2 features in the communication and cooperation input is a decisive condition for the acquisition of these features.

The PI procedures (i.e., explicit information of a specific linguistic form, information about a particular IP strategy, and structured input activities) certainly welcome intentional learning. Although some of the IP studies based fully on organized inputs (e.g., VanPatten & Oikkenon, 1996), the essence of exercise is that they always encourage willful learning. VanPatten (2004) states that both input processing and the Interactional Hypothesis aim at making "input manageable" (p. 26) by focusing on the "first hurdle" (p. 25) (i.e., intake) of language acquisition. This is especially important for beginner or intermediate learners. The current study indicates that the fact that the instruction made the features noticeable is a crucial factor in the case of any kind of grammar structure.

The results for the measurable investigations are affirmed by those obtained from the attitude survey, showing that in spite of the fact that the elementary learners acknowledged as part of the PI's success in their understanding of the destination structure, they were not particularly active about production tasks. They may have struggled with creating a newly learned language feature. Intermediate and advanced learners also appreciate the character this classroom grammar guide plays. Taken together, these consequences assume to ascertain that the special part of the processing instruction on L2 learning is to boost ways of targeting language production. In all cases, it is helpful in the classroom to outline and adopt this form of instruction so that learners can first notice, acquire and afterwards by being given some extra time asked to produce a linguistic form.

Conclusion

The overall findings from this research corroborated the effectiveness of PI research according to which learners being exposed to PI enhanced their capability of interpreting as well as producing the sentences including the targeted features. However, the elementary level learners were challenged in the production of the linguistic aspects possibly due to limited speech production skills and limited attentional resources. The results, therefore, espouse that PI modifies the way learners of English analyze sentences consisting of the grammatical structures. The findings indicate that this approach was responsible for the improved processing and the enhanced accuracy in production.

The significant findings of the current study provide complementary and crucial evidence to the appropriateness of PI to grammar instruction in order to change the not proper processing strategies. Furthermore, it advocates the theoretical position that PI influences learners' developing interlanguage system. Just by changing the interlanguage system we will achieve impacts on tasks that were not embedded within instruction.

One of the criticisms leveled at task-based language teaching is its effectiveness for beginner learners. This criticism is based on a wrong assumption – namely that tasks-based instruction requires the use of production tasks. This study has appeared that task-based instruction can be effectively executed by means of input-based errands that persuade apprentice learners additionally that it is more effective than TI. The beginning participants of this study with zero competence of English exhibited successful acquisition of the receptive knowledge of past-tense regular form after receiving the PI instruction. The analysis of the data showed that the learners were involved in the input-based tasks and even attempted to produce the L2-although not very fruitful. Therefore, it is believed that output tasks need to be encouraged and employed by teachers in task-based classrooms to make learners familiar with both receptive and productive types of knowledge.

Perhaps, the elementary level learners could have improved their production of their learned linguistic feature if they had been exposed to more sessions of instruction. This is acknowledged as a limitation in this study and warrants further attention. Studies can adopt longitudinal and qualitative designs where they may investigate the development and restructuring of the interlanguage systems applying a task-based instruction in foreign language contexts.

References

Al-Shammari, A. H., & Sahiouni, A. A. (2023). Impact of textual enhancement and input processing on syntactic development of EFL university students in Kuwait. *Education and Information Technologies*, 1-17. DOI: 10.1007/s10639-023-11799-1

Benati, A. (2005). The effects of PI, TI and MOI in the acquisition of English simple past tense. *LanguageTeaching Research, 9*, 67-93. http://dx.doi.org/10.1191/1362168805lr154oa

Benati A. (2016). Processing instruction and the acquisition of Japanese morphology and syntax. In A.

Benati & S. Yamashita (eds), *Theory, research and pedagogy in learning and teaching Japanese grammar* (pp. 73-98). Palgrave Macmillan. DOI:10.1057/978-1-137-49892-2_4

Benati, A. (2021). *Input Processing and Processing Instruction: The Acquisition of Italian and Modern Standard Arabic*. Benjamins Publishing. https://doi.org/10.1075/bpa.11

Benati, A. (2023). The Nature, Role, and Effects of Structured Input Activities. *Languages*, 8(2), 135. https://doi.org/10.3390/languages8020135

Benati, S., & Angelovska, T. (2016). The effect of processing instruction on the acquisition of English simple past tense: Age and cognitive past demands. *International Review of Applied Linguistics in Language Teaching, 53*(2), 249–269. DOI:10.1515/iral-2015-0012

Benati, A., & Chan, M. (2023). Motivational factors and structured input effects on the acquisition of

English causative passive forms. *Ampersand, 10*. https://doi.org/10.1016/j.amper.2023.100111

Carroll, S. (2001). *Input and evidence: The raw material of second language acquisition*. John Benjamins. https://doi.org/10.1075/lald.25

Farley, A. (2004). Processing instruction and the Spanish subjunctive: Is explicit information needed? In B. VanPatten (Ed.), *Processing instruction: Theory, research, and commentary* (pp. 227-239). Erlbaum.

Gass, S, M. (1997). *Input, interaction and second language learner*. Lawrence Erlbaum Association Inc. https://doi.org/10.4324/9780203053560

Ghasemi Torkabad, M., & Fazilatfar, A. M. (2014). Textual enhancement and input processing effects on the intake of present and past simple tenses. *Procedia-Social and Behavioral Sciences, 98*(6) 562-571. DOI: 10.1016/j.sbspro.2014.03.452

Jusczyk, P.W., & Klein, R.M. (2014). *The nature of thought*. Psychology Press.

Lee, J. F. (2004). On the generalizability, limits, and potential future directions of processing instruction research. In B. VanPatten. (Ed.), *Processing instruction: Theory, research, and commentary* (pp. 311-323) Erlbaum.

Lee, J. (2015). The milestones in twenty years of processing instruction research. *IRAL, 53*, 111–126. https://doi.org/10.1515/iral-2015-0006

Lee, J. F., & VanPatten, B. (1995). *Making communicative language teaching happen*. McGraw-Hill.

McLaughlin, B.M. (1987). *Theories of second language learning*. Edward Arnold.

Morgan-Short, K., & Bowden, H. W. (2006). Processing instruction and meaningful output-based instruction: Effects on second language development. *Studies in Second Language Acquisition, 28*, 31-65. https://doi.org/10.1017/S0272263106060025

Naami, A., & Sahragard, R. (2022). The effect of field independence on processing instruction on the acquisition of English passive by Iranian EFL learners. *Instructed Second Language Acquisition*, 6(1), 109–139. https://doi.org/10.1558/isla.20078

O'Malley, J. M. & Chamot, A. U. (1990). *Learning strategies in second language acquisition*. Cambridge University Press.

Rikhtegar, O., & Gholami, J. (2015). The effects of pre- versus post-presentation input flooding via reading on the young Iranian EFL learners' acquisition of simple past tense. English LanguageTeaching, 8(3), 80-88. DOI. 10.5539/elt. v8n3p80

Rong, L. (2022). Processing Instruction to Teach English Reflexives to ESL Learners: A Computer Delivered Study. *Journal of Second Language Acquisition and Teaching (JSLAT),* 28, 5-39.

Rossomondo, A. (2007). The role of lexical temporal indicators and text interaction format in the incidental acquisition of the Spanish future tense. *Studies in Second Language Acquisition,* 29, 39-66. https://www.jstor.org/stable/44488644

Santamaria KD, MuÃoz ML, Atkins JL, Hobbs DR, O'Donald K. (2013). A preliminary investigation into the application of processing instruction as therapy for aphasia in Spanish speakers. *Journal of Communication Disorders*. 46: 338-50. DOI. 10.1016/j.jcomdis.2013.07.001

Sarkhosh, M., & Sarboland, E. (2012). Different textual enhancement formats and the intake of English past simple tense. *International Journal of Linguistics,* 4(2), 459-474. DOI: 10.5296/ijl.v4i2.1861

Schmitt, N. (1994). Vocabulary testing: Questions for test development with six examples of tests of vocabulary size and depth. *Thai TESOL Bulletin,* 6(2), 9-16.

Schneider, W., & Shiffrin, R. M. (1977). Controlled and automatic human information processing: detection, search, and attention. *Psychological Review*, 84, 1-66. https://doi.org/10.1037/0033-295X.84.1.1

Shintani, N., Li, S., & Ellis, R. (2013), Comprehension-based versus production-based grammar instruction: A meta-analysis of comparative studies. *Language Learning*, 63, 296-329. https://doi.org/10.1111/lang.12001

Suzuki, Y., Nakata, T., & Rogers, J. (2023). Optimizing input and intake processing: A role for practice and explicit learning. In *Practice and Automatization in Second Language Research* (pp. 39-62). Routledge.

VanPatten, B. (1990). Attending to content and form in the input: An experiment in consciousness *Studies in Second Language Acquisition, 12*, 287-301. DOI: 10.1017/S0272263100009177

VanPatten, B. (1996a). *Input processing and grammar instruction: Theory and research*. Norwood, Ablex.

VanPatten, B. (2004). Input processing in second language acquisition. In B. VanPatten (Ed.), *Processing instruction: Theory, research, and commentary* (pp. 5-31). Erlbaum.

VanPatten, B. (2007). Input processing in adult second language acquisition. In VanPatten B. and Williams, J. (Eds.), *Theories in second language acquisition* (pp.115-135). Erlbaum.

VanPatten, B. (2015a). Input processing in adult second language acquisition. In B. VanPatten & J. Williams (Eds.), *Theories in second language acquisition: An introduction* (pp. 113–134). Routledge.

VanPatten, B. (2015b). Foundations of processing instruction. *IRAL,* 53, 91–109. https://doi.org/10.1515/iral-2015-0005

VanPatten, B., & Cadierno, T. (1993). Explicit instruction and input processing. *Studies in Second Language Acquisition, 15*, 225-243. https://www.jstor.org/stable/44487619

VanPatten, B., & Fernández, C. (2004). The long-term effects of processing instruction. In B. VanPatten (Ed.), *Processing instruction: Theory, research, and commentary* (pp. 273-289). Erlbaum.

VanPatten, B., Inclezan, D., Salazar, H., & Farly, A. P. (2009). Processing instruction and dictogloss: A study on object pronoun and word order in Spanish. *Foreign Language Annals,* 42, 3, 557-575. https://doi.org/10.1111/j.1944-9720.2009.01033.x

VanPatten, B., & Oikennon, S. (1996 b). Explanation vs. structured input in processing instruction. *Studies in Second Language Acquisition*, 18, 495-510. DOI: 10.1017/S0272263100015394

VanPatten, B., & Sanz, C. (1995). From input to output: Processing instruction and communicative tasks.   In F.R. Eckman., D. Highland, P. W. Lee., J. Mileham., and R. R. Weber. (Eds.), *Second language acquisition theory and pedagogy* (pp.169-185). Erlbaum.

VanPatten, B., and Wong, W. (2004). Processing instruction and the French causative: Another replication. In B. VanPatten. (Ed.), *Processing instruction: Theory, research, and commentary* (pp.97-118). Erlbaum.

Wong, W. (2005). *Input enhancement: From theory and research to the classroom*. McGraw-Hill.