

Depth of Processing in Different Instructional Conditions and Iranian Learners' Interpretation of English Inversion Structures

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Abstract

The idea of encouraging awareness in classrooms is not new, but research into awareness is beginning to encourage those involved in language teaching to think more systematically about how language presentation facilitate language awareness. Awareness can be promoted through focus on form activities as it triggers important cognitive processes in L2 acquisition. The effectiveness of various input- and output-based focus on form instructions on the acquisition of different grammatical structures and the role of awareness in each type is a matter for debate. The present study qualitatively investigated the effects of Processing instruction, Textual enhancement, and Text editing on L2 learners' cognitive processes and the relationship between the learners' level of awareness and their abilities to interpret English inversion structures. To do this, learners' think-aloud verbalizations during instruction were recorded, transcribed, and coded. Criteria to decide which level of awareness they would fall into were slightly adapted from Leow, Hsieh, and Moreno (2008) to fit with the type of tasks employed in the study. Pretest-posttests design was also employed to measure learners' interpretive abilities. The findings indicated that each instructional technique promoted different levels of awareness and depth of processing. The findings also provided explanations for the non-significant differences in performances between the Processing instruction and Text editing groups on an immediate posttest and outperformance of the Processing instruction group on a delayed posttest. Given the benefits that Processing instruction and Text editing brought about in the present study, both might be incorporated into a curriculum and serve as complementary tools for language teachers.

Keywords: Depth of Processing, Level of Awareness, Processing Instruction, Textual Enhancement, Text Editing

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1. Introduction

Recent second language acquisition (SLA) research recognizes the necessity of attention to grammar and demonstrates that form-focused instruction is especially effective when it is incorporated into a meaningful communicative context (Nassaji & Fotos, 2011). *Focus on form* was proposed and termed by Long (1991) in response to the problems presented by exclusive focus on grammar emphasized in one approach and exclusive exposure to meaningful communication emphasized in the other approach to the teaching of grammar. A large body of evidence suggested that L2 learners benefit from form-focused grammar instruction (e.g., Doughty 2003; Ellis, 2001; Long, 1991; Norris & Ortega 2001) as it calls for an integration of grammar and communication through a set of input- and output-based instructional techniques and varying degrees of implicitness and explicitness.

Another major impetus for studies of form-focused instruction has been Schmidt's (1990, 2001) Noticing Hypothesis as well as what was provided by Long (1991). Schmidt (1990, 2001) claimed that learning an L2 is largely a conscious process, proposing different related levels of consciousness: *noticing* as rehearsal in short-term memory and *understanding* as rule understanding. He argued that awareness at the level of noticing is necessary for input to become intake and awareness at the level of understanding is a facilitating factor for L2 acquisition. Robinson (1995) also viewed the role of awareness as a necessary and sufficient condition prior to taking and further processing of any L2 data. Supporting Schmidt's (1990; 2001) Noticing Hypothesis, Swain (1998) argued that rule understanding leads to a deeper awareness of the target forms and Leow (2000) also asserted that level of awareness plays a critical role in form learning. Focus on form studies took a new dimension with the emergence of such theoretical positions emphasizing the role of attention and awareness in language learning and the positions that explained the way that the right kind of input (e.g., VanPatten, 1996) or output (e.g., Swain, 1995) can assist the noticing process.

Following the idea that both input- and output-based instructions can be effective for SLA, many studies have attempted comparisons under a variety of research designs (e.g., Cho, 2010; Song, 2007; Song, 2010; Swain, 2000). A point of debate is whether form-focused input- and output-based instructions are equally effective in drawing learners' attention to form in ways that promote acquisition and whether output-based instruction can be as effective as input-based instruction. There are still unanswered questions in the literature in terms of the degree of effects of various instructional conditions on the acquisition of different grammatical structures and the role of noticing in each type of instruction.

The present study aimed at investigating the possible effects of Processing instruction (PI) and Textual enhancement, as input-based, and Text editing, as output-based instruction on learners' awareness and their ability to interpret one type of English inversion structure. The study investigated the efficacy of tasks conducted under different instructional techniques focusing on the qualitative aspects of noticing. Depth of processing is employed to code think-aloud protocols produced by the participants during instruction. Thus, the research questions were as follows:

1. Do any of the three instructional groups verbalize deeper levels of processing measured by thinking-aloud protocols?
2. Do learners' reported levels of awareness correlate with their abilities to interpret the English inversion structures?

2. Literature Review

2.1. Attention and Awareness in Language Learning

The way in which attention mediates the process of selection and subsequent memory of input has been underscored in SLA research. Among several theoretical underpinnings in SLA, Schmidt's (1990) Noticing Hypothesis, Tomlin and Villa's (1994) functional model of input processing, and Robinson's (1995) model of the relationship between attention and memory addressed the role of both attention and awareness. Schmidt's (1990) Noticing Hypothesis posited that attention is necessary to understand every aspect of an L2, controls gaining access to awareness, and is responsible for noticing. Schmidt (1990, 2001) distinguished awareness at the level of noticing and awareness at the level of understanding. He defined *noticing* as rehearsal in short-term memory which results in mere intake and *understanding* as rule understanding which leads to deeper learning characterized by restructuring and system learning. Tomlin and Villa (1994) described noticing as three separate but interrelated components: "alertness (overall readiness to deal with incoming stimuli), orientation (the direction of attentional resources to a certain type of stimuli), and detection (the cognitive registration of the stimuli)" (p. 192). They argued that detection, which does not imply awareness, is the significant moment that facilitates SLA. Robinson (1995) defined noticing as not only detection but also verbal report of what is noticed in short term memory. Like Schmidt, he assumed that noticing involves awareness and plays a critical role in learning an L2. Although the above mentioned definitions are different in the degree and level of awareness necessary for language learning, all agrees on the important role of noticing. Izumi (2002) pointed out that noticing the target forms does not necessarily encourage the cognitive processes that are necessary for acquiring a language. Izumi further explained that even though

learners may notice the target forms, the depth of processing necessary for acquisition may not get involved.

2.2. Depth of Processing and Level of Awareness

Depth of processing is a construct first proposed by Craik and Lokhart (1972) in the field of cognitive psychology to discriminate between deep and shallow processing. Depth of processing measures mental or cognitive effort that a learner is engaged in processing the new information even if it has not resulted in an accurate gain related to the underlying rule. Depth of processing has been adopted in SLA to refer to amount of attention (e.g., Shook, 1994), type of attention (e.g., Gass, Svetics, & Lemelin, 2003), mental effort (e.g., Kim, 2008; Leow, Hsieh, & Moreno, 2008), quality of noticing (e.g., Qi & Lapkin, 2001), and levels of awareness (e.g., Leow, 1997; Leow, Nuevo, & Tsai, 2003; Leow et al., 2008). Criteria to identify a low level of awareness (noticing) are completely similar to those used to identify a low depth of processing. These criteria are quite different when higher levels of awareness are reported. An accurate conclusion related to the target form is not necessary to reach a deep level of processing. In other words, deep level of processing may not lead to an accurate understanding. In fact, awareness at the level of understanding, which includes a deep level of processing, can result in full or partial understanding. Different studies tested Schmidt's (1990) Noticing Hypothesis and levels of awareness employing verbal protocols to elicit learners' instances of awareness (e.g. Leow, 1997, 2001; Rosa & O'Neil, 1999; Rosa & Leow, 2004). For example, Leow (1997) reported three levels of awareness: level of noticing (+ cognitive change, - meta-awareness, - morphological rule), level of reporting (+ cognitive change, + meta-awareness, - morphological rule), and level of understanding (+ cognitive change, + meta-awareness, + morphological rule). These studies showed that higher levels of awareness were directly correlated with a more accurate recognition and production of the target form, yielding significantly higher accuracy at performance.

2.3. Methods of Measuring Noticing in SLA

A wide range of methods have been used to measure the concept of noticing, including offline measures such as retrospective protocols (e.g., Kang, 2010) or stimulated recall including questionnaire or interview (e.g., Uggen, 2012) and online measures such as underlining (e.g., Song & Suh, 2008), note-taking (e.g., Cho, 2010; Izumi, 2002), think-aloud protocols (e.g., Alanen, 1995; Leow, et al., 2008), and eye-tracking (e.g., Godfroid, Bores, & Housen, 2013). Leow (2000) asserted that think-aloud protocols are the optimal way to collect information on learners' level of awareness. Following it and regarding the shortcomings of the other mentioned measures, think-

aloud protocols were adopted as a measure to assess participants' level of awareness in the present study.

2.4. The Instructional Conditions of the Study

Processing Instruction (PI) is a psycholinguistic and input-based approach to grammar instruction based on VanPatten's (1996, 2004) input processing model. As indicated by VanPatten (1996), Processing Instruction "is a type of grammar instruction whose purpose is to affect the ways in which learners attend to input data" (p. 2). When learners receive or are exposed to input they tend to rely on internal strategies to process the input they receive. PI guides and focuses learners' attention when they process input (VanPatten, 2007). In the present study, PI was operationalized as an explicit, non-paradigmatic explanation of the target forms in Farsi, followed by information about processing strategy and the way for avoiding the faulty strategy through referential and affective structured input (SI) activities. The learners were presented with texts including the target forms and required to read one or two paragraphs and do the activities. According to VanPatten (2004) *referential* activities require learners to attend to form to get meaning and give a right or wrong answer so the teacher can check whether the student has made the suitable form-meaning connection. Instead, *affective* activities do not require learners to have a right or wrong answer; they express a belief or an opinion as involving in processing information about the real world.

Textual enhancement is another input-based approach to teaching grammar aiming to increase learners' attention to linguistic forms by presenting input perceptually more noticeable (Nassaji & Fotos, 2011). Textual enhancement which is an external form of input enhancement (Doughty & Williams, 1998) and an implicit attention-drawing device (Schmidt, 1993) intends to achieve this by making particular aspects of input easy to notice by means of various typographic devices, such as *bolding*, *underlining*, and *italicizing* in written input, or acoustic devices such as *added stress* or *repetition* in oral input (Nassaji & Fotos, 2011). In the current study, textual enhancement was operationalized as the enhancement of the target forms using coloring. The target structure and the sentence with which it showed agreement had the same color in two passages presented to the participants in the Textual enhancement group. Totally, 12 different colors were used to attract students' attention to 12 target forms provided in each text.

Nassaji & Fotos (2011) defined text editing as a way of pushing learners to produce certain forms accurately requiring them "to correct a text in order to improve its accuracy and expression of content". It can be used either individually or collaboratively (p. 110). Editing task is an authentic

class task which succeeds in eliciting learner attention to a variety of grammatical and lexical choices (Storch, 1997). The participants of the Text editing group in this study completed one editing task during each treatment session. First, the learners read the original text copies based on which the editing task is. The learners were asked to read and pay attention to the content and jot down notes. Then, the text copies were collected and the participants received the editing task and were asked to correct any erroneous section as correctly as possible to the original text. At last, the text was distributed again and the students were told to compare their edited versions with the original version.

2.5. Target Structure

Inversion is one of the English structures that does not frequently appear in instructional materials and was shown to be problematic for learners as it requires changing the usual word order (Jabbarpoor & Tajeddin, 2013). Based on the types of inversions introduced by Cowan (2008), the target structure of the present study is one form of lexical inversions “used to link content across clauses” (p. 537). The theoretical and pedagogical reasons for choosing the target structure for focus on form in the present study were as follow: first, the specific targeted feature (so/neither + auxiliary (do/does) + subject) selected for this study has not been integrated into the school English syllabus and not frequently occurred in the input; second, these structures were chosen after considering VanPatten’s *primacy of content words principle* (VanPatten, 1996, 2004). According to this principle, learners tend to pay more attention to content words at the expense of ignoring function words in order to obtain maximum information from input. These function words have low communicative value and are low in saliency; for example, in an utterance like ‘So do I’, all the words are function words. Based on this principle, it is difficult for learners to process these forms. Thus, it is worth trying to investigate the saliency of this form for learners and push them away from the faulty strategy of *the primacy of content words*.

2.6. Theoretical Framework and Empirical Studies

All the techniques investigated in the present study (PI, Textual enhancement, and Text editing) are based on focus on form instruction. The mentioned techniques are based on a cognitive framework of SLA, aiming at directing learners’ attention to the formal features of the L2 that they would not notice. Therefore, Schmidt’s (1990) Noticing Hypothesis serves as a theoretical basis for Sharwood-Smith’s input enhancement techniques (1991, 1993), VanPatten’s model of input processing (2002, 2004), and Swain’s Output Hypothesis (1985). In addition to the Noticing Hypothesis, VanPatten’s model of input processing also forms the theoretical framework of PI. The input processing model is part of a cognitive theory of SLA

(Harrington, 2004). According to VanPatten (2004), processing does not exactly refer to “perception of a form” or “noticing” (p. 6). Processing refers to making a form-meaning connection. That is, a learner notices a form and determines its meaning or function simultaneously (VanPatten, 2004). To this end, in PI, unlike Textual enhancement and Text editing, learners are exposed to explicit instruction combined with a series of input processing activities, encouraging the comprehension of the target structure. These activities have been suggested to create form-meaning connections in input and consequently process form for meaning (Lee & VanPatten, 1995). Contrary to Swain’s (1985) claim, VanPatten (2002, 2004) believed that PI learners do not need to produce language to be led to syntactic analyses of language.

While all of the instructional techniques examined in this study try to draw learners’ attention to the formal features of language based on a cognitive framework of SLA, they are different regarding their focus on ways to draw learners’ attention to the targeted forms. Several studies, conducted to explore the effects of input and output quantitatively, did not show a clear relationship between these conditions, noticing, and learning.

Baleghizade and Saharkhiz (2013) compared four intervention types for teaching the simple past passive focusing on their transferability to spoken output. An interview was structured as pretest, posttest, and delayed posttest to compare traditional intervention (TI) as the comparison group and processing instruction (PI), consciousness-raising (CR), and input enhancement (IE) as three task-based groups. The study employed both quantitative and qualitative approaches. PI learners outperformed all the other groups denoting its high potential for transfer of training to spoken output. Regarding their abilities to use the target structure, the results were in favor of the CR group in comparison with the TI group. There was no significant difference between the results of these two groups regarding their retention. TI group showed lower effectiveness in this context. Temporary transferability was proved for the CR group due to the significant difference between its posttest and delayed posttest results. Qualitatively, PI resulted in true negotiation of meaning and deep-level learning, CR resulted in negotiation over function and deep-level learning, IE resulted in unfocused interaction about meaning, and TI just resulted in interaction about form.

Izumi (2002) examined the effectiveness of output and input enhancement on the acquisition of English relative clauses by adult second language learners. The study addressed whether output triggers noticing of L2 forms in the input and affects learning of the forms. The study also addressed whether such output-oriented noticing and learning would be the same as that promoted by visual input enhancement designed to draw learner’s attention to problematic target forms in the input. Note scores and subjects’ scores on pre- and posttests were used as two types of noticing

measures. The findings of the study indicated that those exposed to both types of instructions outperformed those engaged in the same input with no manipulation or output production. The results showed that those exposed to the input enhancement noticed the target form, but they did not perform better than the other groups. Accordingly, Izumi came to this conclusion that output production results in a deeper level of processing which lead to greater gains of the target forms than receiving visual input enhancement. The study failed to measure the learners' level of awareness.

Studies by Alanen (1995) and Leow (1997) demonstrated that input enhancement techniques alone may not end in mastery of the target structure. Alanen (1995) examined the effect of italic enhanced texts on the acquisition of Finnish structures by 36 native English learners. All learners thought aloud during instruction. The results revealed that the participants who received rule and rule-and-input enhancement techniques improved over the textual enhancement and control groups. No clear-cut difference between the textual enhancement and control groups was found. Analysis of think-aloud protocols indicated that the textual enhancement group produced more incorrect suffixes due to overgeneralization of the rule and the performance was influenced by the attention paid to the target forms during instruction.

In another study, Leow (2001) chose 74 Spanish learners to examine the effect of textual enhancement (TE) in L2 reading texts on comprehension, acquisition, and noticing. The participants were given a multiple-choice recognition task and a fill-in-the-blank production task. They were also asked to think aloud. Noticing was operationalized by any translation of the target form during instruction, circling of the target, verbal reference to it, or any taking notes about the form. The results indicated that that simple enhancement (TE alone) may fail to affect on learners' comprehension and acquisition. The results also revealed that input enhancement might serve a distracter to learners attempting to interact with the texts. In addition, the findings suggested that the enhanced text did not promote noticing more than the unenhanced texts.

Song (2007) examined the effects of three attention-inducing techniques: typographical input enhancement (TIE), picture-cued writing (PCW), and combination of both (TIE+PCW). These instructional techniques were investigated for their efficacy on learning and noticing of the English past hypothetical conditional by Korean students. In order to measure the amount of noticing triggered by each treatment condition, the participants were also asked to underline the parts that they felt as necessary for the following task while they were reading. The results showed that there were no differences between the PCW and TIE+PCW output groups in production. The two output groups performed better than the TIE input group. The results also indicated that the three groups performed equally in the receptive

knowledge posttest. Moreover, the findings revealed that the output groups noticed the target features more than the TIE group. That is, those who received a picture-prompted writing chance noticed the target form significantly more than the input group which did not receive such an opportunity. The findings were consistent with Izumi's (2002) study and it supported the Output Hypothesis proposed by Swain (1985) and Schmidt's (1990; 2001) Noticing Hypothesis. However, the findings did not lend support to Cho's (2010) findings.

Cho (2010) investigated the effects of textual input enhancement (TIE) and written recall, as an output-based instruction, on noticing and acquisition of the English present perfect by Korean learners. One of the reasons for the choice of the target form was that it has a relatively higher communicative value. That is, the present perfect carries semantic value and refers to both events in the present and past. Note-taking was a measure of noticing in the study. The findings indicated that receptive (not productive) knowledge of the target forms was influenced by TIE regarding noticing and acquisition. Performance of the participants on measures of acquisition was not affected by written recall. The results supported Schmidt's (1994) claim that TIE induce learners' attention and it lead to better learning of forms. The efficacy of TIE on noticing in this study could be justified by the relatively great communicative value of the target form. It is consistent with VanPatten's (1996) Input Processing (IP) model which claims that learners are likely to identify and process the forms with higher communicative value more easily.

The results of the two studies conducted by Kang (2010) and Song (2010) support Song's (2007) findings. Kang (2010) investigated the role of written output in promoting learners' noticing and appropriate use of grammatical forms that they found problematic. A retrospective questionnaire was given to the learners in order to find more about the noticing process. The results indicated facilitative effects for note-taking in triggering noticing and promoting grammatical accuracy. Moreover, analysis of the participants' answers to the retrospective questionnaire revealed the model text was useful in assisting them improve their writing through noticing the structure of descriptive writing, particular words, and their syntactic features.

Song (2010) examined the effectiveness of an output practice, Chinese-to-English translation, on promoting noticing and acquisition of lexical phrases. The EG participants were interviewed to see whether the noticing function of output was supported. They reported that most of their underlines were the phrases which they were required to use while doing the translation. Song argued that EG paid more attention to the target phrases. Moreover, the results indicated that there was an immediate incorporation of

the target form by the EG in the output practice. The differences between the performances of the two groups in the multiple-choice recognition test were not significant. However, the significant difference between the output and input groups in the translation test confirmed the impact of output in promoting noticing.

Uggen (2012) explored whether L2 production affects learners' attention to present and past hypothetical conditional in subsequent input. Noticing was measured by triangulating the data from the participants' underlining, their essays, and the stimulated recall data, whereas language learning was assessed by means of pre- and posttests as well as performance on their essays. Nearly all participants underlined vocabulary items rather than the grammatical cues in the reading text. The stimulated recall (a qualitative measure of noticing) clarified that a few EG participants talked about grammar related to past hypothetical conditional. Learning was greater with more complex structure as the simpler structure of the present hypothetical conditional may have been less salient, a factor that influences noticing. Underlining (a quantitative measure) did not reveal the positive effects of output on noticing.

In summary, studies examining the effectiveness of input and output have shown varying results for the benefit of input over output. Some studies have suggested an overall positive effect for such techniques on noticing but they did not provide proof of learning. Findings of studies such as Izumi (2000) and Uggen (2012) suggested that more research on the qualitative aspects of noticing is required which is related to how data is processed. Motivated by the findings of such studies, the present study investigates how each technique relates to noticing, focusing on its qualitative aspects.

3. Method

3.1. Participants

Pre-intermediate participants were selected by a NELSON proficiency test, series 150 B (Fowler & Coe, 1976) from four intact classes of BA/BS students enrolled in Azad University General English course. The participants were supposed to have little or no knowledge of the targeted forms as these structures are not included in the school curriculum and this was also confirmed through a pretest. Participants showing knowledge of the target grammatical structure 20% or lower on pretest were selected for the study. Several students in each class were excluded from the study due to various reasons such as the results of the proficiency test, pretest, and their irregular class attendance during instructions and test administrations. After administering the proficiency test and the pretest, they were exposed to different instructionals. The number of participants was 31, 28, 30, and 33 in

Processing instruction, Text editing, Textual enhancement, and control group respectively. All participants were female freshmen or sophomore, aged 18 to 25, and shared similar linguistic backgrounds.

3.2. Materials and Instruments

Three types of instruments were employed in this study: treatment materials to instruct the target inversion structures, tests to measure knowledge of inversion structures, and a process measure of depth of processing to address the frequency of instances of processing and to identify level of awareness per instructional condition.

3.2.1. Treatment Materials

Treatment materials contained materials for the PI group, the Textual enhancement group, and the Text editing group. In each treatment session, one 400-word constructed text containing 12 instances of the target structure (6 so + do/does + subject and 6 neither + do/does + subject) were presented to the participants of all the three instruction groups. The texts were the same but manipulated based on the principles underlying each instructional condition. To ensure that the texts were of appropriate level of difficulty, it was piloted on a group of learners who had similar characteristics as the target groups. In so doing, the texts were given to a class of pre-intermediate learners with 21 students. Learners were asked orally about the difficulty of the texts, and then, they were asked to answer some comprehension questions following the texts. Learners reported that the texts were comprehensible. The comprehension questions in the two texts were also answered 75% and 77% correctly by learners indicating the fact that the texts were almost appropriate for the level of the pilot group. Moreover, Flesch Reading Ease Scale was used to determine the readability indices and equal difficulty of the texts used for instructing the instruction groups.

PI materials were produced based on VanPatten's (2004) guidelines and the samples available in the literature. The activities were developed at the sentence level (handout examples) and discourse level (reading passage) as moving from sentence to connected discourse is one of the principles of designing PI activities specified in VanPatten (2004).

PI materials in the present study included all the three essential components previously mentioned. The first component of PI, in the studies on the learning of the grammatical forms, was presented to the learners using their L1 as it was in several studies (e.g. Toth, 2006; VanPatten & Fernandez, 2004; Wong, 2004). Therefore, a handout containing a brief introduction of the target structure in Farsi and examples in English were given to the participants. Then, the participants were explicitly reminded of avoiding the faulty strategy of *the primacy of content words principle* in comprehending this type of English inversion structure (VanPatten, 1996; 2004). Four

structured input activities (two referential and two affective activities) were developed for each treatment session following the principles specified in VanPatten (2004). The students were asked to read one or two paragraphs of the passage and do the related structures input activities.

The same texts were typographically enhanced for inversion structures, utilizing coloring as an enhancement technique. Coloring, among other enhancement techniques, was preferred in the present study as using the same color for each pair of the sentences can attract the learners' attention to the relation between the pair. Therefore, it can help the learners infer the meaning of the sentences, containing "so" and "neither" and the simple present sentences to which they show agreement. In each instruction session, learners were asked to read individually a passage. In order to ensure that all the participants could understand the content of the texts, the teacher first explained the words that might affect their comprehension to help them get the meaning conveyed by the passages completely as according to Nassaji and Fotos (2011), in textual enhancement, learners should read the text for meaning. Further sentential examples for the new vocabulary were provided by the teacher. To fulfill the purpose of the task, learners were explicitly instructed to attend to the enhanced forms while reading for comprehension of the text content. Finally, they were asked to answer some general and specific comprehension questions. These are various forms of "post-reading activities" that the teacher uses to keep learners' attention on meaning (Nassaji & Fotos, 2011, p. 41). The teacher did not explain why certain forms were highlighted in the input and did not provide any additional metalinguistic information either.

During each treatment session, the learners of the Text editing group completed one editing task. First, the teacher distributed the original text copies to the learners to read it. The learners were asked to pay attention to the content and take notes. These texts were the same as those used in the PI and the Textual enhancement group but the target forms were neither based on SI activities nor textually enhanced. Then, the text copies were collected and the participants received the editing task and were asked to correct any erroneous section as correctly as possible to the original text. Finally, the text was distributed again and the students were told to compare their edited versions with the original version. No feedback was provided after the students completed the task. The edited texts were collected and the same procedure was repeated in the next treatment session. Each editing task contained 16 erroneous sections, almost half of which were related to the target structures, and the others were not. The number of errors was based on the number of words in the passage and adopted from Storch's (2007) and Nassaji and Tian's (2010) studies. The non-target errors were the errors often found in EFL learners' writing: errors in the choice of tense and verb form,

singular plural form of nouns, use of articles, prepositions, and word forms (e.g., Wu & Garza, 2014; Zhan, 2015).

3.2.2. Interpretation Assessment Task

In order to measure the effects of instruction on the participants' performance of the target structure, a sentence-level interpretation test was developed in three versions (A, B, C) and administered as pretests, immediate posttests, and delayed posttests. Target forms interpretation was one part of the assessment tasks in our research study. The learners were also required to produce it at both sentence- and discourse-level, not dealt with here. In designing the interpretation test, Ellis's (1995) principles were followed. The *interpretation* test had two assessment parts. The first part consisted of 15 two-sentence dialogues including 10 target and 5 non-target (distracter) forms. Participant were asked to read each dialogue carefully and made a choice between three given statements that corresponded best to the meaning of the dialogue within a time limit.

Example (Target):

Mary: I like painting.

Ellen: So do I.

- a. Just Mary likes painting
- b. Ellen doesn't like painting
- c. Mary and Ellen like painting

Example (Distracter):

Jane: Is Megan in the bank?

Bob: I think so.

- a. Bob thinks Megan is in the bank
- b. Bob and Megan are in the bank
- c. Jane is in the bank

The second part, in the same way, consisted of 15 sentences including 10 target and 5 non-target forms. Participants were asked to read the sentences and made a choice between three given statements that corresponded best to the meaning of the final underlined part containing the target form.

Example:

Ken writes well and so does Amanda.

- a. They write well
- b. Amanda doesn't write well
- c. Amanda writes well, too

In the two parts of this test, the participants indirectly indicated whether or not they processed the inversion structures correctly or not. For example, if a participant chooses option c in the second task, they would correctly interpret the underlying role of the target form to show agreement.

To ensure the quality of the tests and equality of the three versions, a test specification document was created using Fulcher and Davidson's (2007) test specifications. Moreover, a small group of experienced English language teachers analyzed the tests and individual items and agreed that the tests were consistent with the instructional objectives of the treatments and they

measured what they were designed to measure. They also agreed that the tests and items were appropriate for the level of the learners. The reliability of the assessments in this study was examined by the internal consistency method. The Cronbach's alpha estimated for the interpretation tests (version A, B, and C respectively) which was 0.72, 0.68, and 0.74 was considered acceptable.

3.2.3. Think-aloud Verbal Protocols

To operationalize awareness, think-aloud protocols were incorporated into the research design to shed light on the cognitive processes that learners engaged in while interacting with language input and output. To this end, the learners were asked to say whatever came to their mind. Their think-aloud verbalizations were recorded, transcribed, and coded to gain insights into the participants' depth of processing and level of awareness.

3.3. Procedure

Data were collected over five sessions. All sessions took place in the university language laboratory equipped with computers, sets of headphones, and microphones to record think-aloud protocols. Session 1 consisted of recruitment, consent form signing, and homogenizing the participants of the groups through giving them a proficiency test. It took approximately 5-10 minutes to complete the consent form and a demographic questionnaire and 50 minutes to finish the proficiency test. 155 students were selected out of 202 students who took the Nelson Test based on the results of their performance ($M=39.22$, $SD=5.83$). The participants whose scores fell one SD above and below the mean on the proficiency test were selected to take part in the study. This ensured that all were homogeneous regarding their English proficiency and were at the pre-intermediate level of language proficiency.

Pre-test measures were given to the participants one day later in session 2 (15-20 min). The pretest was not expected to react with the experimental treatments since the participants showing knowledge of the target grammatical structure 20% or lower (to be on the safe side) on pretest were selected for the study and exposed to different kinds of treatments (PI, Textual enhancement, and Text editing) in three instruction groups. The control group received input including only the regular materials covered in their general English book with no reference to the target grammar items.

One week later, participants in the treatment groups started the instruction in session 3 (35-40 min). The target form instruction lasted two consecutive days with no homework as done in the studies conducted by Farley (2004) and Lee & Benati (2007). In session 4, the participants were first told that they had to think aloud all the time, saying clearly and loudly what they were thinking. Then, the researcher presented them with one

paragraph of a text and modeled a participant thinking aloud, saying aloud any thought came to her mind while reading the text. The researcher emphasized the importance of thinking aloud and not just reading the text aloud. Finally, in order to make the learners feel more comfortable with the procedure, they were asked to voluntarily model thinking aloud to record. Thinking aloud instruction took about 20 minutes. After that, they were exposed to instruction of the target form while verbalizing their thoughts (40-45 min). The treatment along with thinking aloud took approximately 10 minutes longer than it without thinking aloud in all instruction groups. Then, after recording think-aloud verbalizations, the participants completed immediate posttest measures of interpretation. Following Farley (2004) and Qin (2008), the delayed posttest was given two weeks after the immediate posttest (session 5)

3.4. Data Analysis

Level of awareness was measured through think-aloud protocols during the participants second exposure to the target forms. Depth of processing was adopted to code the recorded data. The data was transcribed by two of the researchers and later compared and revised. Considering the qualitative nature of the data, approximately 30 % of the data (10 from each instruction group) were double-coded by the two authors. A joint decision was made in case of disagreement. Criteria to decide which level they would fall into were slightly adapted from Leow et al. (2008) (see Table 1) to fit with the type of experimental tasks employed in the study.

Thirty think-aloud protocols were transcribed and coded to address the frequency of instances of processing per level per instructional condition. Instances of low, medium, and high depth of processing were compared to see if any of the three instructional conditions elicit deeper levels of processing as measured by think-aloud protocols.

For each participant, separate scores were calculated for the interpretation. Only the target items were scored. On the interpretation items, each correct response received one point. Therefore, the range of possible scores was 0-20. Repeated measures ANOVA was performed on the interpretation data with group (PI, Textual enhancement, Text editing, and control) as the main independent variable and time (pretest, immediate posttest, and delayed posttest) as the repeated measure.

To address the relationship between the participants' level of awareness and their posttests performance, all instances of processing provided by 10 participants in each instruction group were re-analyzed to identify their level of awareness during treatment and the most frequently reported level was selected. Then, each participant was coded for noticing (low depth of processing), reporting (medium depth of processing), or

understanding (high depth of processing). Finally, the two posttests scores of the participants during the quantitative data collection procedures were referred to indicate whether the higher levels of awareness correlated with higher performances or not.

Table 1

Operationalization of Depth of Processing

	Low depth of processing	Medium depth of processing	High depth of processing
Level of awareness Description	Level 1 (Noticing) Show no potential for processing target form grammatically	Level 2 (Reporting) Comments on target form in relation to grammatical features	Level 3 (Understanding) Arrives at an inaccurate, partially or fully accurate target underlying grammatical rule
Descriptor	-Pause before or after the target form -Translate the sentence that is indirectly related to the target form and leave the target in English -Carefully pronounces target form -Repeats target form -Say she isn't sure what it is -Low level of cognitive effort to process target form grammatically	-Make comments that indicate some processing of target form -Carefully emphasizes target structure (including rising intonation or prolonging some sounds or syllables or saying "oh"!) -Arrives at a partial translation -Some level of cognitive effort to process target form grammatically	-Makes/tests/confirms hypotheses regarding target form -Provides an inaccurate, accurate and/or partially accurate rule -Translates the target form -Corrects a previous translation -High level of cognitive effort to process target form grammatically

4. Results and Discussion

4.1. Results

4.1.1. Investigating the First Research Question

Thirty Think-aloud protocols produced by the participants were randomly selected, transcribed and coded to find out whether studying inversion structures under different instructional conditions differentially affected the depth of processing of the target forms during instruction.

Think-aloud protocols produced a total of 301 instances of processing. As seen in Table 2, PI, the more explicit input-based instruction, and Text editing, the output-based instruction were related to more instances of high depth of processing while the implicit input-based instruction, the Textual

enhancement, yielded more instances of low depth of processing. PI and Text editing groups made, tested, and confirmed more hypotheses regarding the target form. They also provided some rules related to the target form, translated it and corrected previously translated target forms. Based on the descriptors presented in Table 1, PI and Text editing groups indicated higher level of cognitive effort to process the target form. Protocols revealed that the low and medium depth of processing of the target structure is well associated with noticing and reporting levels of awareness, whereas high level of processing resulted in full or partial understanding of the rule of the target form.

When instances of medium depth of processing were compared, the three instructional conditions produced an approximately similar number of instances, with the PI group producing slightly more than the text editing and the textual enhancement groups. They made comments on the target form, emphasized it carefully and translated it showing some level of cognitive effort to process the target form grammatically. With regards to the instances of low depth of processing, the Textual enhancement group produced more instances than the PI and the Text editing groups. Instances indicating low level of cognitive effort to process the target form grammatically were as follows: pausing before and after the target form, translating the sentence that was indirectly related to the target form and leaving the target form in English, carefully pronouncing or repeating it, and saying that she was not sure what it was. Regardless of the depth of processing, if the total number of instances is considered, it seemed that all the three instructional conditions produced the instances approximately equal.

Table 2

Number of instances of processing per level per instructional condition

Type of instruction										
		Processing instruction			Text editing			Textual enhancement		
Processing	Low	17			20			53		
	Medium	40			35			36		
	High	Total	Full	Partial	Total	Full	Partial	Total	Full	Partial
		39	26	13	41	22	19	20	7	13

According to the data in Tables 3-5, the participants' low depth of processing was encoded into 6 themes, medium depth of processing encoded into 3 themes, and high depth of processing, including partial and full understanding, each encoded into 3 themes.

Table 3

Coding Scheme 1: Frequency of Instances of Levels of Processing in Processing Instruction Group (n = 10)

Level	Theme	Frequency	
Noticing	<i>Pause before the target form</i>	1	
	<i>Pause after the target form</i>	3	
	<i>Translate the sentence that is indirectly related to the target form and leave the target in English</i>	4	
	<i>Carefully pronounces target form</i>	5	
	<i>Repeats target form</i>	3	
	<i>Say she isn't sure what it is</i>	1	
	Reporting	<i>Make comments that indicate some processing of target form</i>	14
<i>Carefully emphasizes target structure (including rising intonation or prolonging some sounds or syllables or saying "oh"!)</i>		9	
<i>Arrives at a partial translation</i>		17	
Understanding	Partial	<i>Makes/tests/confirms hypotheses regarding target form</i>	4
		<i>Provides an inaccurate rule</i>	3
Full	Full	<i>Provides a partially accurate rule</i>	6
		<i>Provides an accurate rule</i>	11
		<i>Translates the target form</i>	10
		<i>Corrects a previous translation</i>	5

Apparently, the most frequent themes are related to medium and high depth of processing. *Making comments about the target forms* and *arriving at a partial translation* were the most frequent themes related to processing at the level of reporting. *Providing a partially accurate rule* was the most frequent theme related to processing at the level of partial understanding and *providing an accurate rule* was the most frequent theme related to processing at the level of full understanding.

Accordingly, similar to the PI group, the most frequent themes are related to medium and high depth of processing. The most frequent themes related to processing at the level of reporting were *making comments about the target forms* and *arriving at a partial translation*. *Making, testing, and confirming hypotheses about the target forms* and *providing an inaccurate rule* were the most frequent themes related to processing at the level of partial understanding. Translating the target forms was the most frequent theme related to processing at the level of full understanding.

Apparently, the themes of low and medium depth of processing are the most frequent ones. The most frequent themes related to processing at the level of noticing were *repeating* and *carefully pronouncing the target forms*. *Emphasizing the target structure* was the most frequent theme related to processing at the level of reporting.

Table 4

Coding Scheme 2: Frequency of Instances of Levels of Processing in Text editing Group (n = 10)

Level	Theme	Frequency
Noticing	<i>Pause before the target form</i>	2
	<i>Pause after the target form</i>	4
	<i>Translate the sentence that is indirectly related to the target form and leave the target in English</i>	3
	<i>Carefully pronounces target form</i>	5
	<i>Repeats target form</i>	4
	<i>Say she isn't sure what it is</i>	2
Reporting	<i>Make comments that indicate some processing of target form</i>	16
	<i>Carefully emphasizes target structure (including rising intonation or prolonging some sounds or syllables or saying "oh"!)</i>	7
	<i>Arrives at a partial translation</i>	12
Understanding Partial	<i>Makes/tests/confirms hypotheses regarding target form</i>	8
	<i>Provides an inaccurate rule</i>	7
Full	<i>Provides a partially accurate rule</i>	4
	<i>Provides an accurate rule</i>	7
	<i>Translates the target form</i>	9
	<i>Corrects a previous translation</i>	6

Table 5

Coding Scheme 3: Frequency of Instances of Levels of Processing in Textual Enhancement Group (n = 10)

Level	Theme	Frequency
Noticing	<i>Pause before the target form</i>	2
	<i>Pause after the target form</i>	8
	<i>Translate the sentence that is indirectly related to the target form and leave the target in English</i>	6
	<i>Carefully pronounces target form</i>	11
	<i>Repeats target form</i>	19
	<i>Say she isn't sure what it is</i>	7
Reporting	<i>Make comments that indicate some processing of target form</i>	11
	<i>Carefully emphasizes target structure (including rising intonation or prolonging some sounds or syllables or saying "oh"!)</i>	15
	<i>Arrives at a partial translation</i>	10
Understanding Partial	<i>Makes/tests/confirms hypotheses regarding target form</i>	4
	<i>Provides an inaccurate rule</i>	5
Full	<i>Provides a partially accurate rule</i>	4
	<i>Provides an accurate rule</i>	4
	<i>Translates the target form</i>	2
	<i>Corrects a previous translation</i>	1

Here are some concrete exemplars of the data coded for the three levels of awareness (noticing, reporting, and understanding). Instances of recorded think-aloud protocols written in each part were reported by different participant.

Awareness at the level of noticing. Activity A in the PI group. She reads: “*I know what to do and what not to do*” and translates: “من میدونم چه کاری” “انجام بدم و چه کاری انجام ندم” and just reads the target form: “*and so my classmates*”.

Activity B in the PI group. She reads: “*We come to class on time and so does she*” and “*If a student comes late, she gets so angry*” and repeats: “*so does she...she gets so angry*”, and then, says: “I’m not sure which one refers to an agreement”.

Step 1 in the Text editing group. She pauses after reading: “*neither do the other teachers*”.

Step 3 in the Text editing group. While reading: “*she doesn’t let us eat or drink in her class...*”, she pauses and says: “another difference...*neither the other teachers do*”.

Textual enhancement group. Reading: “*The girls don’t chew gum and neither do the boys*”, she carefully pronounces *neither* in “*neither do the boys*”.

Textual enhancement group. The participant reads: “*we don’t enjoy the tiring and uninteresting class and neither does the teacher*” and then repeats the colorful parts: “*we don’t enjoy... neither does the teacher*”.

[*Low level of processing: translating the sentence that was indirectly related to the target form, carefully pronouncing the target form, saying she was not sure what it was, and repeating the target form, pausing after/before the target form, carefully pronouncing the target form, and repeating the target form*]

Awareness at the level of reporting. Activity C in the PI group. She reads: “*We don’t know why we have to do this and neither does the head teacher*”. Then, she says: “Here is *neither* again”. She reads loudly: “...*so does she*” and then says: “ok...I got it”.

Step 1 in the Text editing group. She reads: “*We don’t enjoy the tiring and uninteresting class and neither does the teacher*”, saying: “What is the meaning of *neither*”, repeating: “*Neither does the teacher...I’ll forget it...I write it*”.

Textual enhancement group. She reads: "... *neither do the boys.... neither do the other teachers*", translating, "هیچکدوم از پسرا.... هیچکدوم از معلماتی دیگه".

[*Medium level of processing: making comments on the target form, emphasizing the target form, and arriving at a partial translation*]

Awareness at the level of understanding. Activity A in the PI group. She reads: "...*so do the boys*" and says: "*do after so*". Then, she reads another target form: "...*so does she*" and repeats: "*does...do*" and says: "here is does", searching for a rule. "Maybe it depends on the pronoun after it", testing the hypothesis that she formed.

Activity B in the PI group. She reads: "*If a student comes late, she gets so angry*" saying, "hmm...why is *so* here...it should be at the beginning...No". She gets that this structure does not indicate agreement. Then, after reading this sentence aloud: "*We don't leave early and neither does she*", she says: "there's a difference between *so* and *neither...neither* must be negative, I think". She forms a hypothesis made about the polarity of the target forms.

Step 2 in the Text editing group. She reads loudly: "*We don't leave early and...*" and translates the correct form: "و او هم نه... it's ok, I'm sure". [Error: We don't leave early and neither she does].

Textual enhancement group. After reading more colorful instances of *neither*, she confirms this hypothesis, too: "*so* with positive sentences and *neither* with negative ones". She confirms it for all when she says: "I think the boys and the girls must do the same things".

Textual enhancement group. During the post-treatment tasks when answering to the comprehension questions, she tries to apply the hypothesis she has formulated: "*The girls don't like our new math teacher and neither do the boys... neither do the boys... نداره اونو دوست نداره...*" after she reads the question: "Do the girls like the new math teacher? What about the boys?"

[*High level of processing: forming a hypothesis about the polarity of the target form, forming and testing a hypothesis about the tense of the target form, searching for its grammatical rule, and translating the target form*]

4.1. 2. Investigating the Second Research Question

A visual examination of Table 6 reveals that mean Interpretation scores on pretest for all groups appear to be similar, ensuring that the participants were homogeneous in relation to their interpretive knowledge of the target structure at the outset. The Control group had the lowest mean score on the posttests. On the immediate posttest, among the instruction groups, the Text editing group had the highest mean score (15.17), while the Textual enhancement group had the lowest mean score (11.73). On the

delayed posttest, the PI group had the highest mean score (13.90), while the Textual enhancement group had the lowest mean score (8.46).

In order to determine if there was/were any specific type(s) of instruction which could improve the learners' ability to interpret the inversion structures more effectively than others, between-group comparisons (see Table 7) were carried out by submitting the participants' scores on the pretest, the immediate posttest, and the delayed posttest into repeated measures one-way ANOVA (significance level was set at .05). Regarding the effect of instructions on learners' interpretation of the target structures, results of a one-way ANOVA in Table 4 showed that there was no significant group difference in participants' ability to interpret inversion structures before the treatment ($F(3, 118) = 1.03, p > .05$). The results of the one-way ANOVA in the immediate posttest ($F(3, 118) = 292.36, p < .05$) and the delayed posttest ($F(3, 118) = 153.63, p < .05$) showed a significant main effect for type of instruction.

Table 6

Descriptive Statistics for Scores on the Interpretation test by Group at Pretest, Immediate Posttest, and Delayed Posttest

	Mean	SD	Variance	Min	Max	Range
PI						
Pre-test	2.25	0.96	0.93	0	4	4
Immediate post-test	14.48	3.33	11.12	10	20	10
Delayed post-test	13.90	2.49	6.22	9	19	10
Text editing						
Pre-test	2.01	1.21	1.47	0	4	4
Immediate post-test	15.17	2.38	5.70	11	19	8
Delayed post-test	11.57	2.45	6.03	7	17	10
Textual enhancement						
Pre-test	2.16	1.20	1.45	0	4	4
Immediate post-test	11.73	2.44	5.99	8	17	9
Delayed post-test	8.46	3.02	9.15	4	15	11
Control						
Pre-test	1.78	1.13	1.29	0	4	4
Immediate post-test	2.42	1.09	1.18	0	4	4
Delayed post-test	1.90	1.23	1.52	0	5	5

Table 7

Between-Group Analysis of Variance for Interpretation test Scores

	SS	df	MS	F	Sig
Pre-test					
Between Groups	4.00	3	1.33	1.03	.378
Within Groups	151.47	118	1.28		
Total	155.47	121			
Immediate post-test					
Between Groups	3848.16	3	1282.72	292.36	.000
Within Groups	517.71	118	4.38		
Total		121			
Delayed post-test					
Between Groups	2592.69	3	864.23	153.63	.000
Within Groups	663.76	118	5.62		
Total	3256.45	121			

A series of post-hoc Tukey tests were conducted on the scores of the pretests, immediate posttest, and delayed posttest to explain the contrast among the groups. Results indicated that the three treatment groups performed significantly better than the control group on the immediate posttest and there was a significant difference among all groups except between the PI and the Text editing groups. In addition, the results revealed that the three treatment groups performed significantly better than the control group on the delayed posttest and there were significant differences among their scores.

To address the relationship between the participants' level of awareness and their posttests performance, all instances of processing provided by 10 participants in each treatment group were re-analyzed. To do this, the target form instances reported in the think-aloud protocols were referred; the instances were counted for each participant and the most frequently reported level was selected. In the PI group, 1 participant was coded for level 1 (low), 5 participants were coded for level 2 (medium), and 4 participants were coded for level 3 (high). In the Text editing group, 1 participant was coded for level 1 (low), 6 participants were coded for level 2 (medium), and 3 participants were coded for level 3 (high). In the Textual enhancement group, 5 participants were coded for level 1 (low), 3 participants were coded for level 2 (medium), and 2 participants were coded for level 3 (high). The results revealed more mental and cognitive effort during the experimental exposure in the PI and the Text editing instructional techniques and lower mental and cognitive effort during the experimental exposure in the Textual enhancement technique.

Finally, mean scores of immediate posttest and delayed posttest, gained by these participants during the quantitative data collection procedure,

were employed to investigate the relationship between their performance on the posttests and their levels of awareness. The mean posttest scores of the participants in the PI group who were coded for level 1 (low depth of processing) was 8, for level 2 (medium depth of processing) was 9-15, and for level 3 (high depth of processing) was 16-20 during the quantitative data collection procedures. The mean posttest scores of the participants in the Text editing group who were coded for level 1 (low depth of processing) was 8, for level 2 (medium depth of processing) was 9-13, and for level 3 (high depth of processing) was 14-19. The mean posttest scores of the participants in the Text editing group who were coded for level 1 (low depth of processing) was ≤ 6 , for level 2 (medium depth of processing) was 7-11, and for level 3 (high depth of processing) was 12-16. The results indicated that the higher levels of awareness correlated with higher posttests performance when compared to lower levels. The participants who reported higher levels of awareness gained higher scores in their posttests.

Based on the qualitative findings related to question 1, the PI and the Text editing groups had the highest depth of processing while the Textual enhancement group had the lowest. Regarding the results related to question 2, awareness at the level of understanding (high depth of processing) correlated with higher posttests performance when compared to awareness at the level of reporting (medium depth of processing) and awareness at the level of noticing (low depth of processing). The more mental and cognitive effort during the experimental exposure in the PI and the Text editing instructional techniques shed some light on the lack of differential performance between the two techniques in immediate interpretation posttest. The higher depth of processing could provide explanation for the non-significant differences between the two groups. Higher levels of awareness correlated with higher posttests performance when compared to lower levels. Due to the lack of relevant literature, the findings of the current study regarding the effects of the instructional conditions on depth of processing will be mainly discussed regarding the findings of the studies that measured awareness at the level of noticing or the studies that failed to distinguish between noticing and acquisition.

4.2. Discussion

The results of the study indicated that the instructional conditions under which the target forms were presented differentially affected how the learners process the information. Moreover, the higher levels of awareness influenced their interpretive abilities more strongly. Hypothesis forming and testing, and more specifically, rule understanding or system learning were more associated with deeper processing. The findings about the high depth of processing in the PI group learners and its relationship with their posttests performances is in consistent with those reported by Alanen (1995), Rosa and

O'Neil (1999), and Rosa and Leow (2004). Alanen (1995) found that the performance of Textual enhancement group compared to explicit rule presentation group was lower although the Textual enhancement participants reported more instances of the target forms. The results also revealed that learners who could verbalize the rules governing the targeted features, an indicator of awareness at the level of understanding, performed significantly better than those who were not able to verbalize the rules. Rosa and O'Neil (1999) found that the degree of explicitness had a differential impact on L2 development. They also found that the learners who received explicit information about the target structure produced more instances of awareness at the level of understanding than learners in the more implicit condition.

Rosa and Leow (2004) found that participants in their more explicit conditions reported higher levels of awareness and these levels of awareness correlated with higher accuracy at intake as the more explicit instructional conditions outperformed the more implicit ones. They also reported that the effectiveness of awareness retained for three weeks after exposing the learners to the input. Farley (2004) and Fernandez (2008) found that the explicit explanation component of PI is necessary when the target grammatical form is not salient as in the case of the target forms in the current study. Fernandez (2008) claimed that some types of processing problems might require more exposure to more explicit instructions as such components would make learners notice the target forms.

The deeper depth of processing in the Text editing group compared to the Textual enhancement group in the present study is in line with Izumi's (2002) study which showed that output leads to a higher level of language processing and outperformance of English relative clauses than input enhancement. Supporting certain beneficial functions of output, Izumi (2002) argued that production allowed learners to make cognitive comparisons between the target language and their inter-language, pushing them develop their inter-language forms to become more target-like. This is similar to Swain's (1985) noticing the gap, where by means of language production, learners notice the problems in their language abilities and work to search for the linguistic resources necessary to resolve the shortcomings. This search develops deeper awareness of forms and rules rather than meaning at the surface level and adjusts learners into a more internal syntactic mode (Swain, 1998).

The findings of Song's (2007) study also indicated that the output groups noticed the English past hypothetical conditional more than the Textual enhancement group. The findings also concur the results of Jahan and Kormos's (2015) study which showed that only a few participants in the Textual enhancement group gained a detailed understanding of the target form-function mappings of 'to be going to' and 'will'. Therefore, Textual

enhancement alone was not found to be sufficient for making students understand all the details of the targeted forms, although it was effective in promoting learners' ability to notice the target structures.

The findings of the present study are also in consistent with the studies conducted by Song and Suh (2008) and Suzuki and Itagaki (2007) who found partial benefits of output production. Song and Suh (2008) found that output-based tasks are effective at drawing learners' attention to and acquisition of the past counterfactual conditional. Suzuki and Itagaki (2007) also reported the effects of two output tasks (cloze-reconstruction and text reconstruction) on noticing and learning the English passive voice.

The findings contrast with the study conducted by Izumi, Bigelow, Fujiwara, and Fearnow (1999) which indicated that output production could not provide any significant effects on noticing of the form. The findings of the study are also in contrast with what Leow (2001) and Leow et al. (2003) found. Leow (2001) concluded that input enhancement does not have a facilitative effect on noticing as there was no significant difference in the amount of noticing between the experimental and control groups. The findings also revealed that input enhancement does not promote learners text comprehension. Leow et al. (2003) did not report any effect of Textual enhancement on noticing, comprehension, and intake. In the current study, Textual enhancement could trigger different levels of awareness, particularly noticing of the target forms; however, it was much less successful in prompting the higher levels (reporting and understanding) compared to the Processing instruction and Text editing techniques. In addition, Textual enhancement did have effects on the learners' posttests performance.

The results regarding the relationship between the three groups' interpretive abilities and their level of awareness are not in accord with Schmidt (1993) who maintained that noticing is the necessary and sufficient requirement for the conversion of input into intake, and that understanding, which involves processes such as hypothesis formation and testing, is not necessary for that conversion to take place. The findings of the present study are in consistent with Robinson (1997), Leow (1997; 2000; 2001), and Rosa and Leow (2004) who demonstrated that noticing a form is not closely connected to success in language learning. The findings of these studies revealed that very low level of awareness promotes subsequent processing of the target structures in the input. On the contrary, awareness at the level of understanding can predict progress in language learning more strongly.

5. Conclusion and Implications

The current study qualitatively investigated the depth of cognitive processes elicited by L2 learners during input and output processing. Think-

aloud protocols revealed that various instructional conditions promote differential processing among learners even though the number of reported instances of levels of awareness was approximately similar. The PI group, which provided explicit explanation about the target form and the way to avoid the faulty strategy underlying comprehending it, reported more instances of full understanding of the rule of the target structure in the input. The role of high level of cognitive effort also provide possible explanations to account for similar interpretive performance by the PI and the Text editing groups on the immediate posttests and the higher scores on the delayed posttests evidenced by the PI group in this study and other studies exposing participants to explicit grammatical explanations (e.g., Hernandez, 2011; Goo, Granena, Yilmaz, & Novella, 2015; Spada & Tomita, 2010). Full understanding of the rule of the target form as well as high level of awareness led to potentially better retention of L2 learners' interpretive abilities. The findings of the study could not deny the marginality of the implicit input-based Textual enhancement instruction as it promoted the lowest depth of processing, awareness, and the L2 target form development. Given the benefits that Processing instruction and Text editing offered in the present study, a combination of both techniques might be incorporated into a curriculum and serve as complementary tools for language teachers, where learners' attention can be attracted to target forms while engaging in meaningful activities. As in all empirical studies, the present study contained some limitations that might open new ways for future research. Collecting awareness data using thinking aloud has the potential effects of verbalizing thoughts on learners' cognitive processes or lack of actual information elicited by the participants. A methodological triangulation is required for further investigation to capture learners' internal processes more precisely.

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