Processing Instruction and Skill-specificity: In which direction should they go?*

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Byun, Jin-Suk. 2007. Processing Instruction and Skill-specificity: In which direction should they go? *The Linguistic Association of Korea Journal, 15(1),* 15-35. Processing instruction (PI) and skill-specificity may not be compatible with each other in SLA. Though VanPatten (2002a) has argued that PI was never intended to refer to comprehension versus production, PI and skill-specificity make opposite claims at least in terms of the usefulness of output practice. This paper discusses major arguments and empirical studies of each side and suggests following three directions to take for future research. First, further research on the effect of PI on various cross-linguistic structures and better operationalization of traditional instruction would help solve the problem. Second, both sides should differentiate two kinds of knowledge, declarative and procedural knowledge in Anderson's framework (1993) and do more empirical studies on procedural knowledge. Finally, both sides should take into consideration the auto-input function of output suggested in the literature (Ellis, 1994; Levelt, 1989, Levelt, Roelofs, & Meyer, 1999; Platt and MacWhinney, 1983).

Key words: Processing Instruction, Skill-specificity, output practice

1. Preface

These days one of the major issues in current Second Language Acquisition (SLA) is a debate between Processing Instruction (PI) (VanPatten, 2002a, 2002b, 1996; VanPatten & Cadierno, 1993a, 1993b;

VanPatten & Oikennon, 1996) and Skill-specificity (Dekeyser, 1997; Dekeyser and Sokalski, 1996, 2001). PI and Skill-specificity may not be compatible with each other in SLA. Though VanPatten (2002a) has argued that PI was never intended to refer to comprehension versus production, PI and skill-specificity make opposite claims at least in terms of the usefulness of output practice. That is, PI does not regard output practice as a valuable factor affecting a learner's linguistic developing system in SLA whereas skill-specificity maintains that the output practice is an indispensable factor in SLA because production ability is acquired skill-specifically, in other words, only through practice of production. The present paper discusses major arguments and empirical studies of each side and suggests in which direction PI and Skill-specificity should go for future research.

2. Review of the Literature

2.1. Processing Instruction

According to VanPatten (1996), PI is a type of grammar instruction that attempts to affect the ways in which learners attend to and process input data by encouraging a better form-meaning connection. It does not push the learners to produce the target structure. Instead, the learners are pushed to attend to the features of the target form in the input data while they hear or see the target form that expresses some meaning. That is, it is based on Input Processing (IP), which is concerned with how learners derive intake from input in the acquisition process (VanPatten, 2002a). As the goal of PI, VanPatten (1996) stated that "processing instruction is to alter the processing strategies that learners take to the task of comprehension and to encourage them to make better form-meaning connections than they would if left to their own devices" (p. 60).

In SLA, PI can be classified as a focus-on-form or formal instruction in a broad sense. VanPatten (2002a) argues that a critical difference between PI and other input-oriented instruction methods is that unlike

other input orientations, PI does not identify only what problematic forms or structures are but it also analyzes why they are problematic and on the basis of the analysis it pushes learners to incorporate more appropriate processing strategies.

VanPatten and Cadierno (1993a, b) have argued that the flow of second language acquisition is uni-directional, taking the linear order of input, intake, a developing system, and finally output. First, input is converted into intake and some of the intake is fed into a developing system, resulting in the restructuring of the developing linguistic system. Finally output comes at the end of the process after the developing system.

In the PI, as indicated above, output is the end product located at the end of the acquisition process because VanPatten and Cadierno (1993a, 993b) argue that research on output shows that acquired competence is not reflected directly on learner language. In this framework, what is important in SLA is not the practice of output but the manipulation of input which alters learners′ strategies of processing input. Any effort to manipulate learners′ output without providing meaning-bearing input is analogous to an attempt to manipulate the exhaust fumes (output) of a car to make it run better, instead of fueling a better grade of gasoline (input) (VanPatten, 1996). Therefore, PI involves the strategies and mechanisms that facilitate the form-meaning connections during comprehension, where input is converted into intake (Cadierno, 1995). In the framework of PI, the manipulation of output cannot affect the developing system because output is located after the developing system in uni-directional language process. Therefore, as far as output is concerned, VanPatten and Cadierno (1993a, 1993b) argued that it is questionable whether output practice affects the learner′s developing system. According to their explanation, the direction of second language acquisition process is ″from left to right, not from right to left″ (VanPatten and Cadierno, 1993a, p. 46). VanPatten (2002a) has argued that output in SLA may play a role just as a focusing device that directs a learner′s attention to something in the input when there is a mismatch between input and output, and that ″it may play a role in the

development of fluency and accuracy" (p. 762).

Here it seems that PI does not consider fluency and accuracy as constructs that need to be processed in a learner's developing system. However, de Bot (1996) and Nobuyoshi and Ellis (1993) suggest two different types or meanings of acquisition. One is the acquisition as the internalization of new forms, which occurs as the product of comprehending input and the other meaning is the acquisition as the increase in control over forms that have already been internalized, which is promoted by pushing learners to improve their output (Nobuyoshi and Ellis, 1993). Therefore, it appears that PI needs to explain how the developing system is involved in the two types or meanings of acquisition in SLA.

As for the effect of production practice, Ellis also does not seem to fully agree with the idea that production practice is one of the major factors necessary for successful second language acquisition. He agrees with the contribution of output in acquisition in that the learners need to be pushed to make output to gain accuracy and sociolinguistic appropriateness and that output can also function as input for speakers themselves, namely as 'auto-input' (Ellis, 1994). In the discussion of a new rationale for structural syllabus, however, Ellis (1993) argued that grammar teaching should be aimed at 'consciousness-raising' rather than practice. Here his 'consciousness-raising' means a teacher's deliberate attempt to induce a learner's attention to specific features of L2. In other words, he is making the argument that grammar teaching should be involved somehow in the manipulation of input. According to Ellis (1993), it led learners to understand the formal and functional properties of the features through the development of a cognitive representation of them. On the other hand, practice just provided learners with the production opportunities for the development of fully proceduralized implicit knowledge. This means that as VanPatten and Cadierno (1993a,b) argued, output is placed after the learner's developing system in SLA.

It seems that PI is supported by some empirical studies (VanPatten and Cadierno, 1993a, 1993b: Cadierno, 1995; Farley, 2001b; Sanz and

VanPattne, 1998). In their studies VanPatten and Cadierno (1993a, 1993b) were interested in the effects of two different types of instruction on the L2 learner's developing system: traditional instruction through output-based practice and instruction in structured or focused input processing. In the two studies, one of which was a replication of the other research with more subjects (N = 80), subjects were divided into three groups: traditional group, processing group, and no instruction group. The traditional group received traditional explicit instruction on object pronouns in Spanish whereas the processing group received 'processing instruction' on the same grammatical item. The no instruction group received no explicit instruction about the object pronouns.

Since learners of Spanish usually fail to see that Spanish is not a rigid SVO language, they tested how effective it is to alter learners' processing of input containing non-SVO order in relation to object pronouns and direct object clitic. To compare the performance of the processing group with that of the traditional group, which focused on output practice, they developed two different instructional packets for each group. The instructional packet for the traditional group was developed in a way that emphasized traditional grammar teaching and oral practice. On the other hand, the packet for the processing group was involved in teaching the subjects to process input differently from the traditional approach by manipulating input so that it would provide the subjects with instruction about how to interpret OVS strings correctly and how to respond to the informational content of OV strings correctly. For the studies they employed a pretest and three posttests, the first of which was administered on the second day of instruction, the second of which was given to the subjects one week after instruction, and the last of which was administered one month after instruction. The results showed that the instruction directed toward learners' perception and processing of input had been more beneficial than that which focused on production practice in that their input practice led to the increase of learners' comprehension ability without any worse effect on production ability than production practice.

The results of VanPatten and Cadierno's (1993a, 1993b) studies seem to have been supported by many subsequent studies. Farley (2001a) compared the effect of PI with that of instruction not just based on mechanical output practice but on meaningful output practice. In the study he divided twenty-nine subjects into two treatment groups: processing instruction group (N = 17) and meaning-based output instruction (MOI) group (N = 12). He tested Spanish subjunctive of doubt on the subjects following the format of previous research, that is, the PI group receiving only perception-based instruction without having any opportunity to produce the target item. The result showed that though both PI and MOI had positive effects on learners' comprehension and production of Spanish subjunctive of doubt, PI had an overall greater effect than MOI in that the PI group performed significantly better than the MOI group in interpretation task while both groups showed no significant difference in production task.

Interestingly, however, Farley's (2001b) another study, which was a replication of the previous study (2001a) with more subjects and more activities seemed to only partially support the effect of PI. The results of the study showed that although PI had a positive effect on learners' production, PI was not more beneficial to learners than the output-oriented treatment in terms of both comprehension and production. Since his previous study (2001a) had limitations in terms of the size of the subject pool (N = 29) and number of activities used (eight activities), in the replication study Farley (2001b) compared the performance of the processing instruction group and the meaning-based output instruction (MOI) group, employing ten activities of the same target form, Spanish subjunctive of doubt. The results showed that both the PI group and the MOI group performed significantly better in both interpreting and producing the Spanish subjunctive of doubt, which was also notable two weeks after instruction. However, there were no significant differences between the two groups in both interpretation and production tasks.

As for the effect of PI on learners' production, it was also supported in VanPatten and Sanz's (1995) study. The findings of the study

showed that PI had a positive effect on comprehension as well as production. In their study 44 university students in their third semester of the study of Spanish as a foreign language were divided into two groups: no-instruction group (N = 17) and processing group (N = 27). Their study was motivated because the VanPatten and Cadierno's early studies (1993a, 1993b) were criticized for their tasks being too focused or too controlled and limited to the sentence-level. Therefore, into their study VanPatten and Sanz (1995) incorporated for the production test three output measures--the same sentence level task as used in VanPatten and Cadierno, a structured question-answer interview and a video narration task.

Their research question was whether or not the observed effects for PI on the sentence-level task were obtained on other language production tasks. They argued that the result of the study would provide an important insight into SLA in relation to the role of input in language production:

> This [research] question is not trivial because processing instruction does not engage the learner in language production. If the same effects do obtain, then we will have direct evidence that input does drive the learning mechanism in the learner's head, and we will also have evidence for Krashen's assertion that production can emerge on the basis of input processing alone, although in this case, the input is structured and manipulated. (p.174)

In other words, though they do not argue that output is useless in SLA, they maintain that second languages can be acquired when the learners are provided with enough comprehensible input that can be processed, in this case, in the type of structured input.

The results of the study supported PI regardless of the mode of language (oral vs. written) or regardless of test type except in one instance, the oral video narration test, which VanPatten and Sanz (1995) argued was evidence of the effect of PI beyond sentence-level.

A specifically structured input-focused study also supported the

effect of PI. VanPatten and Oikkenon (1996) argued that their study to examine the possible effects of explicit information on PI, supported the increased acquisition through structured input processing activities. Though previous studies on PI (e.g., VanPatten and Cadierno, 1993a, 1993b) seemed to support PI, they were not sure if the results of the previous studies might have been confounded by the learners' monitoring based on explicit information provided to them. Therefore, in their study they divided their 59 subjects into three groups: regular processing instruction (control group), explicit-information-only, and structured-input-only. The regular processing instruction group was given processing instruction on Spanish object pronouns and word order exactly in the same way VanPatten and Cadierno's (1993a, 1993b) subjects had been. The explicit-information-only group received the same explanation and explicit information in their L1 as the regular processing group just without any structured input activities. The structured-input-only group was reverse to the explicit-information-only group. They received the same input-based structured activities but did not receive any explicit information on the target structures even in the form of feedback.

The results of the same format of interpretation and production tests as VanPatten and Cadierno's (1993a, 1993b) showed that for the comprehension task, the structured-input-only group and the regular processing instruction group had performed significantly better than the explicit-information-only group. As a result, VanPatten and Oikkenon argued that the significant improvement of the structured-input-only group and the regular processing instruction group was due to the structured input activities, which was the common denominator in the two groups. For the production task, the results were not so convincing. Though they argue that the structured-input-only group performed almost as well as the regular processing group, the improvement of performance of the explicit-information-only group was not explained in the PI framework. Therefore, it seems that PI needs further research on the effect of explicit information on PI.

Cadierno's (1995) study also supported VanPatten and Cadierno's

(1993a, 1993b) findings. In a study with a similar design to VanPatten and Cadierno (1993a, 1993b), 61 classroom learners of Spanish were divided into three groups: traditional instruction, processing instruction, and no instruction. Like in VanPatten and Cadierno's (1993a, 1993b) study, the traditional instruction involved grammar explanation and subsequent output practice and the processing instruction involved grammar explanation and subsequent input-based practice focusing on altering learners' strategies to process input data. As the target grammar for the study, Cadierno chose Spanish past tense verb morphology. The results showed that the processing instruction group performed significantly better than the other two groups for comprehension task and that there was no significant difference between the processing instruction group and the traditional instruction group for production task though both groups were better than the no instruction group.

In the discussion, she stated that it was difficult to explain for the traditional instruction having had so little effect on comprehension task because it meant that the traditional instruction group had learned to perform the task though they had not acquired any new language. Therefore, she interpreted the result as evidence of two different linguistic systems such as acquired knowledge vs. learned knowledge proposed by Krashen (1977, 1982, 1985). According to Krashen, second language learners have two separate ways of developing their second languages. The first one is acquisition, which is the same language learning process as that through which children develop competence in their first language. The other one is learning, which is the conscious process of learning the usage of language such as grammar rules that are usually taught through formal instruction. However, the better production than comprehension of the traditional instruction group can also be interpreted as evidence of skill specificity which will be discussed in the next section. According to skill specificity, comprehension and production skills are acquired only through comprehension and production practice respectively. Since the output-based traditional instruction group in Cadierno's (1995) study

was given a production task, it appears that they developed only production skill as predicted by skill specificity.

2.2. Skill-specificity

Though PI does not consider output practice to be at least as valuable as manipulated input in SLA, the importance of production practice in SLA has been emphasized by many researchers (Dekeyser, 1997; Dekeyser and Sokalski, 1996, 2001; Swain, 1985, 1993, 1998). Dekeyser and Sokalski (1996, 2001) maintain that VanPatten and Cadierno's (1993a, 1993b) study had problems in both internal and external validity. They indicate as internal validity problems first, the difference of information in quantity and quality which production and comprehension groups received and second, the difference in attention to meaning between the two groups. As an external validity problem, they point out the issue of morphological complexity. DeKeyser and Sokalski (2001) argued that "A morphologically complex structure may be easier to notice but harder to produce correctly than a simpler structure; a simpler structure may be inconspicuous and therefore harder to notice, but easier to produce by virtue of its simplicity" (p. 89).

Because of the morphological complexity issue, as opposed to Spanish direct object clitics which VanPatten and Cadierno (1993a, 1993b) employed for their studies, DeKeyser and Sokalski (1996) incorporated into their study Spanish conditional, which is considered to be easy for perception, but difficult for production. They employed six Spanish classes (N = 82), three for testing the direct object clitic and the other three for testing conditional in their study. They also subdivided the subjects in each grammatical item group into three groups: input practice group, output practice group, and control group Their first hypothesis was, for the direct object clitic, that after instruction the input practice group would perform significantly better than the output practice group on comprehension tasks, showing no difference in performance from the production group on production tasks. Their second hypothesis was, for the conditional forms of the verb, that after

instruction the output practice group would perform significantly better than the input practice group on production tasks, showing no difference in performance from the input practice group on comprehension tasks. Two different versions of practice exercises were employed into the four 25-minute practice sessions, one for the input practice group and the other for the output practice group. The input practice group was required to choose one out of two answer alternatives in most comprehension task questions, and the output practice group was asked to fill in the blanks, translate sentences, or answer questions. The results of a pretest and two posttests, immediate and delayed, were analyzed to test the two hypotheses.

The results showed that their first hypothesis was supported only in part in that in the immediate posttest the input practice group performed significantly better in comprehension tasks and that the output practice group performed significantly better in production tasks. In other words, "the results do not replicate the VanPatten and Cadierno's (1993a, 1993b) findings that output practice does not make a difference for the production of direct object clitics" (DeKeyser and Sokalski, 1996, p. 634). The results of the delayed posttest showed no significant difference among the three groups for either task. Their second hypothesis was also confirmed only in part. For the conditional, the output practice group showed better performance than the input practice group for both production and comprehension in the immediate posttest, which was expected neither by the skill acquisition theory nor input processing. In other words, they "found an overall advantage for output practice for the conditional" (DeKeyser and Sokalski, 1996, p. 634). The results of the delayed posttest, again, showed no significant difference for either task. Given the results, DeKeyser and Sokalski concluded that L2 comprehension and production skills might be learned to some extent separately and that VanPatten and Cadierno's (1993a, 1993b) findings could not be generalized.

Salaberry (1997) also provided counter-evidence to the PI-supporting studies. Using Spanish clitic pronoun which was employed in VanPatten and Cadierno's (1993a, 1993b) studies, he examined the relative effects

of PI and output-based instruction. In the study thirty-three classroom learners of Spanish were assigned into three groups: input practice, output practice, and no practice. The subjects were given three tasks: a comprehension test, a production test, and a written narrative of a one-minute silent video. Contrary to the results of PI-supporting studies, the results showed that the input and the output practice groups improved significantly in comprehension over the no practice group. As for the production and narration task, both the input and the output practice groups showed no significant difference from the no practice group. With the results, Salaberry (1997) argued that "it is doubtful that the qualitative distinction between input processing (development of the L2 system) and output processing (access to the L2 system) can be maintained as the basis of theoretical or pedagogical approaches to L2 grammar development" (p. 441).

The effectiveness of output-oriented instruction as opposed to PI was also supported by Collentine's (1998) study. With Spanish subjunctive, he compared PI with traditional output-oriented approach. Three groups of university students, a processing instruction group (N = 18), an output-oriented group (N = 18), and a control group (N = 18), received two consecutive, fifty-minute treatments on Spanish subjunctive. The result showed that though they performed better than the control group in both interpretation and production tasks, both experimental groups performed statistically equally well in both tasks, which provided further counter-evidence to the argument of PI over traditional output-oriented instruction.

It appears that another study on the issue by Allen (2000), which was a replication of VanPatten and Cadierno's (1993a) study, does not also support the generalizability of input practice over output practice. Using French causative, the study basically maintained treatment fidelity to VanPatten and Cadierno's and consistent definition of PI. The studies only differed in three ways: the grammatical structure, the open-ended production task, and a much larger sample size. For the production task, she used an open-ended format because the controlled nature of sentence completion employed in VanPatten and Cadierno's (1993a) may

not have provided learners with valid opportunities described in Swain's output hypothesis (1985, 1993, 1998, 2000). For sample size, she tested 179 high school students enrolled in nine fourth semester French classes in three high schools. The results showed that there was no significant difference between the input practice and the output practice groups for comprehension task. For production task, the output practice group performed significantly better than the input practice group. From the results, Allen concluded that VanPatten and Cadierno's (1993a) findings were not generalizable to the French causative structure. Interpreting Allen's (2000) findings in relation to their own findings (DeKeyser and Sokalski, 1996), DeKeyser and Sokalski (2001) also argue that the effectiveness of traditional instruction or PI depends on the morphosyntactic nature of the target structure and that the argument of input practice over output practice cannot be made in relation to learning Spanish clitic pronouns because it cannot be generalized to other structures.

3. Discussion

It may be hard to give an answer to the debate between PI and Skill-specificity at this point. However, more refined studies on the issue may lead to a consensus or at least give better insights to SLA in the future. Therefore, this section will make some suggestions for future research on the issue.

First, further research on the effect of PI on various cross-linguistic structures and better operationalization of traditional instruction would help solve the problem. Arguing that Processing Instruction is generalizable, VanPatten (2002a) indicated that replication studies against PI were not, in a strict sense, replications of PI-supporting studies. In response to this argument, DeKeyser, Salaberry, Robinson and Harrington (2002) contended that it was a post hoc argument that led to two important questions about the definition of traditional instruction and the operationalization of it in the actual treatment condition. However, VanPatten (2002b) did not agree with the argument that

traditional instruction is not a well-defined construct. Therefore, it seems that only further research on the effect of PI of various cross-linguistic structures and on how to operationalize traditional instruction would be able to provide answers to the current controversial issue.

Second, both sides should differentiate two kinds of knowledge, declarative and procedural knowledge in Anderson′s framework (1993) and do more empirical studies on procedural knowledge. In the Anderson′s framework of automaticity, there are two different types of knowledge, declarative and procedural knowledge. In terms of L2 acquisition, declarative knowledge is similar to underlying linguistic knowledge and procedural knowledge to skill knowledge. In relation to the two different types of knowledge, though PI-supporters and PI-opponents differ in many respects, there seems to be a point of which both sides make a consensus. DeKeyser and Sokalski (1996) indicated that the findings of the studies on PI could be discussed in terms of declarative and nonautomatized procedural knowledge but not in terms of the automatization process because of the limited amount of practice employed in their study and VanPatten and Cadierno′s (1993a, 1993b) studies. Agreeing with this point, VanPatten (2002) has also stated that VanPatten and Cadierno (1993) had used only accuracy measures to determine any effects due to treatment. He argued, ″Since no measures of response or reaction time were used, we cannot determine to what extent there were differential outcomes among the groups regarding accuracy and speed, the two underlying components of skill development″(p. 791). He also claimed, ″Future research should incorporate reaction time measures when investigating the effects of instruction. Subtle yet important differences between groups might surface with these measures that do not surface with simple accuracy measures″(p. 792). Here what he means by reaction time appears to be closely related to automaticity, namely the proceduralization of declarative knowledge.

In relation to this, DeKeyser′s (1997) study on the automatization of grammatical structures and Byun′s (2006) study on the automatization

of morphosyntactic rules provided good stepping stones. In his study that tested skill-specificity, DeKeyser divided 61 participants into three groups of about 20 each. Then the participants participated in 22 sessions of an hour or less for 11 weeks, learning explicitly and practicing 32 vocabulary and four morphosyntactic rules of an artificial language called Autopractan. More specifically after the participants acquired declarative knowledge of the vocabulary and grammar, they practiced them in comprehension and in production for 15 sessions. Comprehension practice consisted of choosing pictures that matched sentences displayed on the computer screen. On the other hand, production practice consisted of typing in sentences that matched given pictures on the screen. In these practice sessions, Group A practiced two rules in comprehension and the other two in production. Group B practiced the rules in a reverse way: that is, two rules for comprehension for Group A were practiced in production by Group B and the other two for production for Group A were practiced in comprehension by Group B. Group C practiced all the rules both in comprehension and production but half as much as Group A and B. At the last session all three groups were tested on their ability. In this session, Group A and B were tested both in the same condition (comprehension and production tests for the rules they learned in comprehension and production respectively) and in the reverse condition (comprehension and production tests for the rules they learned in production and comprehension respectively). Reaction time and error rate of participants' performance in a single- and a dual-condition were measured to test the skill-specificity. The results showed that practice effect was skill-specific.

Byun's (2006) study also supported skill-specificity in terms of the acquisition of procedural knowledge. The study explored the effect of input and output practice on the automatization of three Korean morphosyntactic rules: word order (SOV), case-marking for nominative (-ka) and accusative (-reul), and classifier constructions. Twenty-eight native speakers of English were assigned into input and output groups to carry out 15 learning, practice, and test sessions over a five-week

period. Their performance was analyzed in terms of reaction time, error rate, and length of time of speech in a dual-task condition. Within-group analysis of the practice and test data was carried out to determine whether automatization had occurred. Between-group analysis of practice and test data was carried out to determine whether automatization had been skill-specific in production and comprehension. The findings showed that gradual automatization took place through practice, following a power law pattern (Logan, 1988), and that automaticity was acquired through skill-specific processing except on error rate in comprehension.

Finally, for future research both sides should take into consideration the auto-input function of output suggested in the literature (Ellis, 1994; Levelt, 1989, Levelt, Roelofs, & Meyer, 1999; Platt and MacWhinney, 1983). Skill-specificity may not apply to the acquisition of comprehension ability. This is because learners' output may function as auto-input to the learners themselves (Ellis, 1994; Levelt, 1989, Levelt, Roelofs, & Meyer, 1999; Platt and MacWhinney, 1983). Ellis (1994) has stated that a learner's output makes a contribution to the acquisition of implicit L2 knowledge by pushing the learner to produce forms close to the target language norms and by providing 'auto-input,' which is the learner's own speech working as input to the learner himself or herself. Here as one of the functions of output in L2 acquisition, he suggests the production of auto-input. When a learner chooses to produce a certain target structure, the next step the learner takes is to process his own utterance as auto-input. In other words, one of the most important resources for a learner's language development is their own speech, namely 'auto-input.'

Levelt et al. (1999) have also indicated the importance of output as auto-input to the speaker. They stated that "the person to whom we listen most is ourself" (p. 6). In other words, one of the most important resources for a learner's language development is their auto-input. Levelt (1989) also mentioned the auto-input function of output in his production model:

A speaker is his own listener. More precisely, a speaker has access to both his internal speech and his overt speech. He can listen to his own overt speech, just as he can listen to the speech of his interlocutors. (p. 13)

Though auto-input is conjectured to play at least some role in L2 acquisition, it seems that no studies have been done specifically focusing on the effect of the auto-input in L2 acquisition so far. Only Platt and MacWhinney's (1983) study showed that four 4-year-old children incorporated their auto-input with grammatical errors into their developing first language system. This suggests that auto-input may play an important role in language learning. If auto-input plays a role in language learning, it may promote automaticity in comprehension just like input from interlocutors. Therefore, although DeKeyser (1997) claimed that production practice would increase automaticity only in production, production practice may also increase automaticity in comprehension because of auto-input and the auto-input should be taken into consideration in studies of skill-specificity.

4. Conclusion

Processing Instruction (PI) and skill-specificity are controversial issues in current SLA. PI is a type of grammar instruction that attempts to affect by manipulating input data the ways in which learners attend to and process it. Therefore, PI does not regard output practice as a valuable factor affecting a learner's linguistic developing system in SLA. This implies that grammar teaching should focus on devising attention-drawing methods when grammar points are presented rather than providing learners opportunities to practice them in the form of output. However, skill-specificity maintains that the output practice is an indispensable factor in SLA because production ability is acquired skill-specifically, in other words, only through practice of production. Therefore, skill-specificity suggests opposite methods to PI in terms of output practice in grammar teaching.

It may be hard to give an answer to the debate between the two different views to grammar teaching in SLA at this point. More refined studies on the issue are expected to unveil the mystery. Hoping to help future researchers to do the task, the present paper discussed major arguments and empirical studies of each side. Also it suggested three areas both sides should examine for future research on this issue. First, in the future there should be more research done on the effect of PI on various cross-linguistic structures and better operationalization of traditional instruction. Second, both sides should differentiate two kinds of knowledge, declarative and procedural knowledge in Anderson's framework (1993) and do more empirical studies on procedural knowledge. Lastly, both sides should take into consideration the auto-input function of output (Ellis, 1994; Levelt, 1989, Levelt, Roelofs, & Meyer, 1999; Platt and MacWhinney, 1983) because skill-specificity may not apply to the acquisition of comprehension ability.

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