



**Traditional Instruction and Processing Instruction:
German Dative Definite Articles**

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This study compares the effects of Processing Instruction (PI), an input-based instructional intervention, and Traditional Instruction (TI), an output-oriented instructional intervention targeting the German dative definite articles. Participants included 56 adult learners enrolled in a beginning level German language course. Learners completed a pretest, treatment, immediate posttest, and a delayed posttest (3 weeks after treatment) measuring both interpretation and production of the German dative definite articles. The results revealed significant immediate and long-term gains for PI on interpretation. Both PI and TI revealed immediate gains on production and PI maintained those gains, whereas TI did not. As such, we discuss the theoretical and methodological implications of these findings.

1. Introduction

Processing Instruction (PI) is an input-based pedagogical intervention based on the principles of input processing (VanPatten 2007) and is designed to push learners away from incorrect processing strategies and towards more optimal processing of input. The effectiveness of PI has been shown with learners of Spanish (e.g., Fernández 2008; Morgan-Short et al. 2006; VanPatten et al. 1993; VanPatten et al. 1996), French (Benati et al. 2008; VanPatten et al. 2004), English (Benati et al. 2008), Italian (Benati 2001, 2004), and Japanese (Lee et al. 2007). PI consists of three parts: (a) explicit grammar information, (b) processing strategy information, and (c) Structured Input (SI) activities. What is important to keep in mind when addressing PI is what distinguishes it from other types of instruction. PI is an instructional intervention that is directed at altering learners' incorrect processing strategies as identified by the principles of Input Processing (see VanPatten 2007 for details on IP). These principles attempt to explain under what conditions learners make initial form-meaning connections, why learners make some form-meaning connections and not others, and what internal strategies learners use in comprehending sentences along with how these strategies might affect acquisition. During PI, learners are trained to alter their non-optimal (*default*) processing strategies and in the same session they are undergoing processing strategy training, they are exposed to an enhanced type of input of a target form. The processing strategy

training element of PI aids learners in correctly processing input and thereby making the necessary form-meaning connections required for acquisition.

Processing strategy training contrasts with output-oriented instruction types that focus on production practice. Traditional Instruction (TI) is the instructional method widely used in most foreign language classrooms in the United States (Fernández 2011; Wong et al. 2003), which consists of the progression from mechanical drills, to meaningful drills, and finally to communicative drills. Although the sequence of drills is found in many foreign language programs, this type of instruction has been criticized for two main reasons (Wong et al. 2003). First, TI is problematic because it forces learners to produce grammatical forms before they are linguistically capable of doing so. Given that acquisition is driven by input, and the sequence of drills involved in TI does not give learners an opportunity to work with input prior to being required to produce the target structures, learners are therefore not linguistically prepared to complete these tasks. Second, TI includes mechanical drills which are devoid of meaning and do not facilitate learners' making of necessary form-meaning connections required for acquisition to take place. Based on these two primary reasons, Wong and VanPatten (2003) conclude that TI does not provide learners with what is needed to acquire a second language. Nonetheless, Fernández (2011) points out that output-based instruction continues to be the dominant form of instruction in foreign language classroom texts. Additionally, despite the positive effects found in many studies suggesting the effects of an input-based approach, Leaver et al. (2004) suggest that resistance to moving away from a traditional output-based instruction type and towards an input-based approach, might be due to the lack of empirical evidence, language difference, and teachers' attitudes.

In response, the current study thus investigates the effects on acquisition of the German dative articles of one input-based instructional type and one output-based instructional type: Processing Instruction (PI) and Traditional Instruction (TI). Therefore, the aim of the current study is to expand the body of research on PI and TI to a target form in German (German dative articles) not previously targeted by these instructional interventions and thereby provide evidence to the effects of an input-based approach in comparison to an output-based approach. The goal is also to push research in new directions by investigating if the effects on acquisition found in previous PI research are generalizable to this language and target form that share the same underlying processing

strategy as previous studies (First Noun Principle), which has not been a target of PI investigations to date. That said, it is worth mentioning that there are many effective communicative methods to teaching German that are operationalized around the globe by professional language instructors and investigating (or reporting on) the effects of these methods is beyond the scope of the present study. The purpose of the present study is therefore to focus on the effects of two types of instruction: Processing Instruction and what we are referring to as Traditional Instruction as it has been operationalized in previous research starting with VanPatten and Cadierno (1993).

2. Background and Motivation

More than two decades have passed since the original Processing Instruction (PI) study (VanPatten et al. 1993) which investigated the role of the First Noun Strategy, a processing problem during which learners assign agent status to the patient in the sentence. The First Noun Strategy is predicted by the First Noun Principle (FNP), which states that learners, at least during beginning stages of acquisition, tend to process the first noun or pronoun they encounter in a sentence as the subject (VanPatten 2007). Typically, PI targets learners in beginning stages of acquisition, however, it is important to point out that the target grammar form investigated in PI studies is not based on the complexity of the form itself but rather the processing strategy with which it is associated. In VanPatten and Cadierno (1993), Traditional Instruction (TI), a mechanical, output-based instructional type which moves from mechanical, to meaningful, to communicative drills, was compared to PI, a meaningful, input-based instructional type predicated on a model of input processing (VanPatten 2007).

This seminal study was the first of its kind that compared an input-based instructional treatment to an output-based instructional treatment. In this study, they compared the effects of exposure targeting the FNP and the Spanish accusative clitics (direct object pronouns) with intermediate learners of Spanish. The results showed that on interpretation tasks, the PI group outperformed both the TI and Control groups, and the the TI and Control groups performed similarly. On production, there were no differences between the PI and TI groups. In other words, the PI group, which did not produce the target form at any time during treatment, performed similarly on production to the TI group, which dedicated the entire treatment time to producing the target form.

This study spurred a series of investigations, whose results also provided positive findings for PI when compared with more traditional output-based designs, such as Cadierno (1995) with the Spanish preterite tense, Benati (2001) with the Italian future tense, Cheng (2004) with the Spanish copula, VanPatten and Wong (2004) with the French causative, and a series of three studies performed by Benati and Lee (2008a, 2008b, 2008c) concerning Italian noun-adjective agreement, the English past tense, and the French imperfect, respectively on interpretation and production. Their results suggest that learners who produced throughout the entire treatment by participating in TI did not perform any better on production than the group that only engaged in input-based activities either immediately after treatment or at the time of the delayed posttest. Additionally, the groups trained to produce were not as effective at correctly interpreting the target form as the input-based group.

On the other hand, positive findings for TI when compared with PI have been found in a number of studies such as Allen (2000), Collentine (1998), DeKeyser and Sokalski (1996), Erlam (2003), and Salaberry (1997) investigating a range of target structures in French and Spanish. However, these studies have been criticized for their lack of similar operationalization for either PI or TI as in the original studies (e.g., Farley 2001; Sanz et al. 1998; VanPatten 2002). Therefore, the conclusions of the effectiveness of TI compared with PI in these studies cannot be viewed in contrast with VanPatten and Cadierno (1993), Cadierno (1995), Benati (2001), Cheng (2004), VanPatten and Wong (2004), and Benati and Lee (2008a, 2008b, 2008c).

Studies investigating the effects of PI on German are limited to one study only, which focused on the role of explicit grammar information (EI) as a variable of PI. Henry et al. (2009), in an investigation targeting the German accusative case markings on articles, aimed to investigate the effect of PI with and without EI. Their findings suggest that twice as many learners exposed to EI reached criterion (answering four input-based items correctly in a row) and began to process OVS input sooner than the group not exposed to EI. In this case, with this particular target form and under these conditions, EI has effects on acquisition.

There is, however, a wide body of research investigating the acquisition and teaching of German grammar from other frameworks. From a theoretical perspective, Arnet and Jernigan (2014) recommend including Cognitive Grammar (CG) lessons which are usage-based and provide learners with accessible grammatical meta-language to be used

in the co-construction of knowledge and scaffolding. They state that, “Because it emphasizes relationships and schemas rather than rules and exceptions, CG provides the student with stronger and broader problem-solving strategies, which promotes language acquisition” (90). Ritterbusch et al. (2006) investigated the learners’ performance gains with case marking and their correlation with English metalanguage, accuracy goals, self-reported processing strategies, and self-assessment of German skills. Of interest to the present study is that learners did in fact employ the First Noun Strategy in which they showed that the “indiscriminate use of this strategy results in errors of case assignment” (38). Jackson (2007) investigated learner development on three separate occasions throughout the course of an academic year on their interpretation of German OSV and SOV word order sentences. Jackson found that OS word order sentences with clausal complements were the most difficult for learners; however, they demonstrated improvements over time. This research also suggests that German language learners ignore the case markings and use the First Noun Strategy during interpretation of OVS type sentences. LoCoco (1987) arrived at this very same conclusion for beginning level German language learners.

Since as early as the late 1950s, research in language acquisition has been interested in internal learner variables such as motivational factors and individual differences and the extent to which they affect language acquisition (Gardner & Lambert, 1959). The findings of their study suggest that differential success among learners may be related to particular types of goals, motivations, strategies, and previous learning. Robinson (2002) also discusses the role of individual differences in language learning at length. Recent research in individual differences has explored the role of working memory capacity (Robinson 1995; Skehan 1998; Leeser 2007), self-confidence levels, motivation and goals, and particular learning strategies (Garner et al. 1997; Csizner & Dornyei, 2005).

On the basis of the findings of VanPatten and Cadierno (1993), in contrast with the findings of the subsequent studies investigating TI paired with PI possibly due to inconsistencies in materials compared with the original study (i.e., Allen 2000; Collentine 1998; DeKeyser et al. 1996; Erlam 2003; Salaberry 1997), this study is, in part, a replication of VanPatten & Cadierno (1993) with some methodological differences. The materials used in this study follow the strict guidelines established by VanPatten &

Cadierno (1993) for PI and TI, which has not been previously investigated with the target German grammar structure investigated in this study.

3. The Present Study

The motivation for the present study is to investigate the effects of a processing-oriented intervention (PI) compared with a traditional output-oriented intervention (TI) on a target form (German dative definite articles) and language (German) not previously investigated in PI research. The purpose of the present study, then, is to extend the body of research in PI to a language and form not previously investigated to assess the generalizability of this processing-oriented approach when compared with TI as originally designed. This study, therefore, seeks to expand the existing research in German to include this particular target form and pedagogical interventions. The following research questions guided the present study:

1. How will type of instruction (PI, TI, no instruction) targeting dative definite articles affect L2 German learners' interpretation of dative definite articles in SVO and OVS type sentences?
2. How will type of instruction (PI, TI, no instruction) targeting dative definite articles affect L2 German learners' production of dative definite articles?

3.1 Target Form

The target form investigated in this study is the German dative article located in SVO and OVS type sentences. Table 1 illustrates the German nominative and dative articles, the latter of which is the target form addressed in this study.

Table 1. German Nominative and Dative Definite Articles

Gender	Nominative Definite Articles	Dative Definite Articles
Masculine	der	dem
Feminine	die	der
Neuter	das	dem
Plural	die	den

The dative article in German functions in the following way: the object of a verb requiring the dative case also requires the definite article of the object to take the dative case. This is an indirect object case that is affected by dative verbs as well as by dative

two-way prepositions. The dative definite article signals which noun is the object whereas, the nominative case marking always indicates which noun is the subject of the sentence. In other words, regardless of word order, the nominative case will invariably indicate the subject of the sentence, and the dative case will invariably indicate which noun is the object.

3.2 Participants

The participants in this study were drawn from seven intact classes at two large public universities and consisted of students enrolled in beginning German language courses. This course is taught using a communicative method almost entirely in German and focuses on all four skills (reading, writing, speaking, and listening). This particular level was chosen because the target form is addressed early on during the subsequent semester and therefore students had no formal exposure to the target form prior to treatment. Each intact class was assigned to one of the two treatment groups (PI or TI) or the control group (NI) who did not receive instruction on the target form. The initial participant pool included 101 participants and after attrition the final N size of those who participated in all three test-times was 56 (PI = 24, TI = 24, NI = 8). As in previous PI research, to be included in the study, the participants had to meet the following criteria: (a) they were L1 speakers of English and did not have a working knowledge of another language, (b) they had no uncorrected visual or auditory impairment, (c) they were present for all three test times, and (d) they scored 60% or lower combined on the interpretation and production pretests. The participants, given that they scored lower than 60% combined on the pretest, had likely not had formal exposure to this particular target form and can be considered beginning language learners.

3.3 Procedure

All instruction and testing (paper and pencil format) took place during participants' regularly scheduled 50 minute class time. Day 1 consisted of recruitment, consent form signing, and the pre-test measures (interpretation and production). One week later, on Day 2, participants in the PI and TI groups completed the treatment and post-test measures however, the control group (NI) was engaged in normal classroom activities unrelated to the target form and only completed the immediate posttest during the last 15 minutes of class. Three weeks later, on Day 3, participants completed the delayed posttests and a language history questionnaire.

3.4 Treatment materials

The instructional materials for all treatment groups (PI, TI, NI) included a consent form, a language history questionnaire, and a treatment packet. Appendix A and Appendix B contain sample activities from the PI and TI treatment packets. The instructional materials for the PI group contained three components: explicit information about the target form, information about learners' default processing strategies, and SI activities. The explicit information in this study consisted of information in English about German dative definite articles and German word order. Participants were also informed about the FNP, which included instruction on how to avoid misinterpreting the first noun or pronoun they encountered in a sentence as the subject. The final component of PI included seven SI activities, delivered in either oral or written forms, each lasting approximately two to three minutes. Feedback was operationalized by asking participants for answers and then by informing them of the correct answer. At no part during PI treatment were participants required to produce the target form.

The instructional materials for TI included explicit information about the German dative definite articles followed by mechanical drills, meaningful drills, and communicative drills. Each activity took approximately two to three minutes for completion. After students finished completing each activity, the instructor selected participants or asked for volunteers to supply their answers to the questions and told them whether their answers were either correct or incorrect. If a participant provided an incorrect response, other participants would be called on until the correct answer was produced.

3.5 Assessment materials

Pretests, posttests, and delayed posttests were used to measure learners' interpretation and production of the target form (dative articles) in German. A split-block test design was used that included three versions of the assessment measures: A, B, and C. In an effort to reduce any test effect, participants did not repeat test versions. Following previous PI research, all test versions consisted of a vocabulary familiarity sheet (to control for vocabulary knowledge), an interpretation task, a distracter section (to clear working memory), and finally a production task.

The interpretation measure used in this study was modeled after the interpretation task used in VanPatten & Cadierno (1993) and consisted of 15 aural sentences, each of which was paired with a set of two pictures, labeled "A" and "B", respectively, and

displayed on a projector screen. The sentence correctly described one of the two pictures, and participants were instructed to choose the picture that corresponded to the sentence and indicate their choice by circling “A” or “B” on a preprinted answer sheet. Of the 15 aural sentences, five items were critical OVS sentences, five items were SVO type sentences, and five items were distracter sentences, which did not contain the target form. A sample of the interpretation task is found in Appendix C.

The sentence-level production task consisted of eight items: four critical and four distracters. Each item consisted of a picture accompanied by an incomplete sentence describing the events in the image. The instructions stated: “Complete the sentences based on the picture. Change the grammatical form as necessary.” For the target form items, learners needed to complete the sentence by writing in the correct answer with the subject in the nominative case (*der/die/das/die*) and the object of the verb in the dative case (*dem/der/dem/den*). For the distracter items, only the subject of the sentence was required to successfully complete the sentence. A sample of the production task is found in Appendix C.

3.6 Scoring and Analyses

Separate scores were calculated for the interpretation and production tasks. For the interpretation task, there was only one correct answer for each item and participants were awarded one point for each correct answer and a score of zero points for an incorrect answer. For the production task, participants received a total of 2 points for each item: one point if the answer contained the correct dative definite article (form) and one point if the sentence accurately described the picture (meaning).

The scores for all tests were submitted to separate 3×3 ANOVAs with repeated measures, with an alpha-level set at 0.05. Instruction (PI, TI, and NI) served as the between-subjects independent variable, and Time (pretest, immediate posttest, and delayed posttest) served as the within-subjects variable. Simple main effects analyses with a Bonferroni adjustment for multiple comparisons were conducted to explore all significant Instruction \times Time interactions.

4. Results

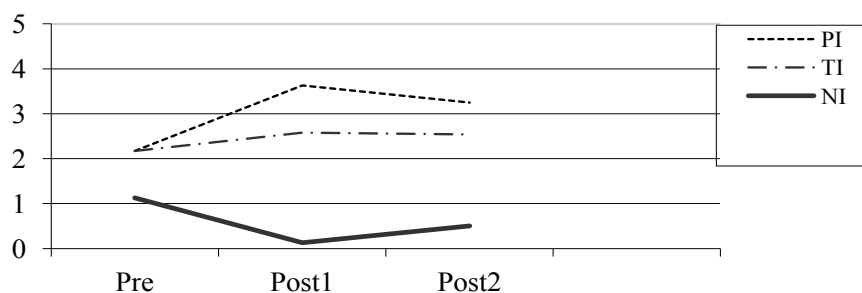
4.1 Interpretation

Table 2 presents the descriptive statistics for each treatment group on each of the three interpretation tests (pretest, immediate posttest, and delayed posttest) targeting the dative articles. A one-way ANOVA conducted on the pretest scores revealed no differences among the three groups, $F(2, 53) = 1.62, p = .207$. Therefore, it can be assumed that any gains in performance were due to the instructional treatments. The 3×3 ANOVA revealed a main effect for Instruction, $F(2, 53) = 5.234, p = .008, \eta^2_p = .17$; a significant Instruction \times Time interaction, $F(4, 106) = 2.99, p = .022, \eta^2_p = .10$; however, not for Time, $F(2, 53) = 0.69, p = .504, \eta^2_p = .013$. This interaction is displayed visually in figure 1.

Table 2. Descriptive Statistics for Instruction Type on the Interpretation Task (dative articles)

Group	Pretest	Post-test 1	Post-test 2
PI			
<i>M</i>	2.17	3.63	3.25
<i>SD</i>	3.10	5.14	4.53
TI			
<i>M</i>	2.17	2.58	2.54
<i>SD</i>	3.10	5.14	4.53
NI			
<i>M</i>	1.13	0.13	0.50
<i>SD</i>	5.35	8.91	7.84

Figure 1. Instruction \times Time interaction on interpretation test



To examine the effect for Time for each of the treatment groups, pairwise comparisons with a Bonferroni adjustment for multiple comparisons were conducted to determine the differences among groups. The significant findings are displayed in Table 3. The pairwise comparisons revealed the following findings. First, only the PI treatment group led to increased performance from the pretest to the immediate posttest and from the pretest to the delayed posttest. No other within group gains was found.

Table 3. Pairwise Comparisons Between Interpretation Tests by Instruction Type (dative articles)

Group	Mean Difference	<i>p</i>
PI		
Post-test 1 > Pretest	1.46	.003
Post-test 2 > Pretest	1.08	.011

In the exploration of the Instruction \times Time interaction, the Bonferroni tests revealed the following differences among groups at each test time: no difference among groups at Pretest ($ps > .05$); the PI treatment group outperformed the NI at Post-test 1 ($p = .004$) and at Post-test 2 ($p = .011$), but there was no difference among any of the other treatment groups (PI or NI) at either post-test time. Neither the TI group nor the NI group outperformed any of the other groups at any time on interpretation. A summary of these findings is displayed in Table 4.

Table 4. Summary of Comparisons Between Instruction Types on Interpretation Posttests (dative articles)

Post-test 1		Post-test 2	
Contrast	<i>p</i>	Contrast	<i>p</i>
PI > NI	.004	PI > NI	.011

4.2 Summary of Interpretation Test Results

In general, the findings for the interpretation results of the dative articles revealed that only the PI group demonstrated both within group and among group differences. PI demonstrated gains immediately after treatment (Post-test 1) and three weeks after treatment (Post-test 2) over the pretest. In terms of differences among the treatment

groups, the PI treatment group was the only group to outperform any other group, as evidenced by PI outperforming the NI immediately after treatment (Post-test 1) and three weeks after treatment (Post-test 2). At no time did the TI group or the NI group demonstrate within group gains or outperform each other or the PI group at any time during the study on the interpretation of the German dative articles.

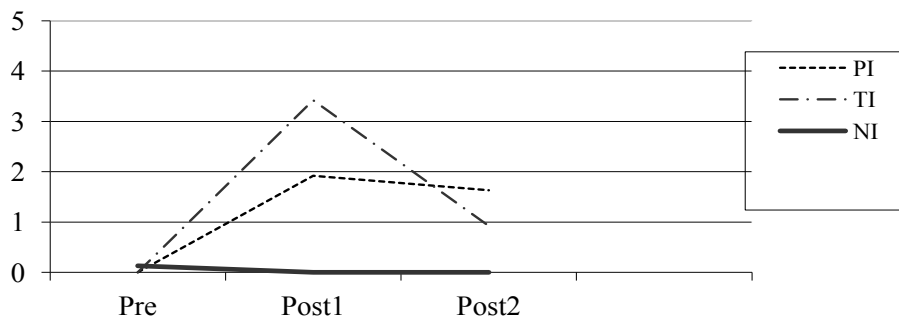
4.3 Production

Table 5 presents the descriptive statistics for the production task of the German dative articles. A one-way ANOVA was conducted on the pretest scores and revealed no differences among the three groups, $F(2, 53) = 3.25, p = .05$, therefore, it can be assumed that any gains in performance were due to instructional treatment type. A 3×3 ANOVA revealed a significant main effect for Time, $F(2, 53) = 10.87, p < .001, \eta^2_p = .17$; Instruction, $F(2, 53) = 4.116, p < .022, \eta^2_p = .134$, and a significant Instruction \times Time interaction, $F(4, 106) = 4.77, p < .001, \eta^2_p = .153$. This interaction is displayed visually in figure 2.

Table 5. Descriptive Statistics for Instruction Type on the Production Task (dative articles)

Group	Pretest	Post-test 1	Post-test 2
PI			
<i>M</i>	0.00	1.92	1.63
<i>SD</i>	0.26	5.03	4.21
TI			
<i>M</i>	0.00	3.42	.92
<i>SD</i>	0.26	5.03	4.21
NI			
<i>M</i>	0.13	0.00	0.00
<i>SD</i>	0.45	8.71	7.29

Figure 2. Instruction x Time interaction on production test



To examine the effect for Time for each of the treatment groups, pairwise comparisons with a Bonferroni adjustment for multiple comparisons were conducted to determine the differences among groups, and the significant findings are as follows. First, both the PI treatment group and the TI treatment group led to increased performance from the pretest to the immediate posttest. The PI group maintained their gains over the pretest three weeks after treatment on Post-test 2. The TI group demonstrated a decrease in performance three weeks after treatment on Post-test 2 from Post-test 1. The NI group did not demonstrate any gains on production at any point throughout the treatment. Table 6 displays the significant findings.

Table 6. Pairwise Comparisons Between Production Tests by Instruction Type (dative articles)

Group	Mean Difference	<i>p</i>
PI		
Post-test 1 > Pretest	1.92	.001
Post-test 2 > Pretest	1.63	.001
TI		
Post-test 1 > Pretest	3.42	<.001
Post-test 1 > Post-test 2	2.50	<.001

In order to explore the Instruction \times Time interaction, the Bonferroni tests revealed the following differences among groups at each test time: no difference among groups at Pretest ($ps > .05$), the TI treatment group outperformed the NI group at Post-test 1 ($p = .004$) but there was no difference among any of the other treatment groups at either post-test time. A summary of these findings is displayed in Table 7.

Table 7. Summary of Comparisons Between Instruction Types on Production Posttests (dative articles)

Post-test 1	
Contrast	<i>p</i>
TI > NI	.004

4.4 Summary of Production Test Results

In general, the findings for production of the German dative articles revealed that both the PI group and the TI group led to gains during treatment. Both groups demonstrated gains from the pretest to Posttest 1, however, the PI group maintained their gains three weeks after treatment (on the delayed posttest) and the TI group did not. In fact, the TI group showed that their performance decreased at Post-test 2 (three weeks after treatment) from their performance immediately after treatment (Post-test 1) and they did not perform significantly better three weeks after treatment than they did prior to treatment. The TI group was the only group to outperform any other group on production, demonstrated by outperforming the group that received no instruction (NI) at post-test 1. The NI group did not demonstrate gains at any time during treatment on production of the German dative articles. Finally, at no test time were there significant differences between the TI and PI groups on production.

5. Discussion

The principle objectives of this study were to investigate and compare the effects of PI, TI, and NI on the interpretation and production of the German dative definite articles. Regarding treatment effects on interpretation, only the group exposed to PI demonstrated any gains on interpretation evidenced by their outperforming the NE group at both post-test times and by their immediate and delayed posttest gains. On the other hand, neither the TI group, nor the NI group, demonstrated gains at any point during the study's duration on the interpretation of the German dative definite articles.

Curiously, the findings for interpretation differ from those of previous research, as they do not mirror the findings of VanPatten & Cadierno (1993), Leeser & DeMil (2013), or White & DeMil (2013). In these previous studies, PI outperformed TI (and NI) on interpretation. With the exception of the present study, PI's performance on interpretation has remained consistent over output-oriented instructional types (such as TI) as

well as across processing strategies, target forms, and languages. Even though PI did not outperform TI on interpretation, PI was still the only group to demonstrate (and maintain) gains over time on interpretation and to outperform the NI group. It appears then that PI is affecting learners' non-optimal (default) processing strategies by pushing them to adopt optimal strategies and thereby facilitating acquisition of these target forms, whereas the output-based instructional intervention, TI, is not. However, why then do the findings of the present study differ from those of previous research over the past twenty years? We will return to address this question after we consider the findings on production.

Regarding treatment effects on production, both treatment groups (PI and TI) demonstrated gains from pretest to the immediate posttest. Additionally, the PI group also maintained their production gains three weeks after treatment (over the pretest), whereas the TI group did not. Moreover, the group that never produced the target form during treatment, PI, performed as well as the group that solely dedicated their treatment time to target form production, TI. Given that the PI group maintained their gains on production three weeks after treatment, PI appears to have a greater impact than TI at affecting how learners process and store linguistic data and subsequently access and retrieve this target form for production.

The findings for production are also mostly consistent with the findings of previous research. VanPatten & Cadierno (1993), Leiser & DeMil (2013), and the present study all found that PI and TI groups performed similarly on production. Regarding the maintaining of gains for the PI group and the decrease in performance for the TI group at the delayed posttest, Morgan-Short & Bowden (2006) found similar results with PI and a meaning-based output instruction type, which suggests that PI affects the underlying linguistic system in a way that output-based instructional interventions does not.

In the case of the present study, however, there are two findings that differ from previous research: (1) in the original VanPatten & Cadierno (1993) study, both PI and TI outperformed the control group on production, and in the current study TI outperformed NI but PI did not, and (2) although PI was the only group to demonstrate within group gains on interpretation, PI did not outperform TI. One underlying difference between these two studies that may explain this difference is token frequency. In the original study, learners were exposed to over 130 target form tokens however, in the current study learners were only exposed to about one fourth of the

items (35 tokens) during treatment. Moreover, given the target form complexity, combined with a radically reduced token frequency, these results are not surprising.

Why then did the current study use such few tokens in comparison with the original study? Research since the original VanPatten & Cadierno (1993) study has ranged in token frequency from 20 tokens (Fernández 2008) to 24 tokens (White, in press a), to 38 tokens (Leeser et al. 2013), to 38 tokens White & DeMil (2013), to 56 tokens (Sanz et al. 2004) and therefore, 35 tokens was chosen as a baseline given that positive findings for PI were found in previous studies with similar (or less) token item numbers. Future research will need to explore the role of token frequency in order to determine if this variable may provide an explanation for these findings.

Shedding light on the findings of token frequency in PI, White (in press b) found that for a target form (Spanish accusative clitics) with the same processing strategy (FNP) as the target form in the present study, token frequency played a role in learners' production (60 and 80 token groups demonstrated and maintained gains on production whereas a group exposed to 40 tokens did not). Therefore, based on the findings of White (in press b), we may expect to also find that token frequency has an impact on the findings with the German dative articles, especially given that they share the same underlying processing strategy.

In summary, neither in previous studies across various processing strategies and target forms, nor in the present study did the TI group, which focused solely on production practice during treatment, outperform the PI group on production. In the case of the present study, however, considering that the TI group did not maintain their gains three weeks after treatment but the PI group, who never produced the target form during treatment, did maintain their gains, it appears that learners' processing was still more affected by exposure to an input-based processing-oriented intervention than an instructional type that focused on production. In other words, PI is doing something here for learners' production even though they never produced the target form during treatment that is sustaining their production accuracy three weeks after treatment. Future research will have to investigate longer-term effects of PI to discover PI's impact over time on this target form associated with the FNP as did VanPatten & Fernández (2004) with the FNP and the Spanish accusative clitics. In their study, they found effects for PI on learners' performance eight months after treatment.

One of the differences between the present study and previous research in PI is the language and target form involved; this is the first PI study to date that has investigated this particular target form in German, although the corresponding processing principle (FNP) has been investigated across target forms and languages. In this case, the findings are predominantly in line with previous research and therefore carry similar pedagogical implications including the support of an input-based pedagogical intervention prior to requiring learners to produce output. This is especially important for languages such as German, considering that some practitioners sense that, given the difficulty level of the German language, it needs to be taught with a focus on mechanical/meaningful production-oriented drills. The implication from studies in PI, is that initial stage language learners may benefit most by instructional interventions that address learners' processing mechanisms such as PI, instead of those focusing on production, as in TI. Effectively, learners should complete input-based tasks first, and then move to meaning-based output oriented activities. The input-based activity component of PI, titled structured input, can be used in combination with any other activities either completed during class or even online in a technology enhanced, hybrid, or fully online language program.

5.2 Limitations, Directions for Future Research, and Conclusions

In light of the findings of the robustness of PI's performance on interpretation (PI was the only group to demonstrate within group and among group gains), PI maintaining their gains on production at the delayed posttest (over the pretest), and TI being the only group to outperform the NI group on production, future research could investigate the individual variable of PI and TI that is shared: explicit information. Future research will need to investigate the effects of SI alone (without explicit information) compared with PI and EI in order to determine the causative variable for the gains observed in this study as in VanPatten & Oikennon (1996). In other words, research needs to investigate whether the causative variable is due to the presence of explicit information paired with SI activities (forming PI) or if it is the SI activities that are facilitating acquisition. Future research can also investigate online methods of assessment (e.g. Fernández 2008; VanPatten et al. 2009) to track learners' behavior in reaching criterion. Future research will also need to address the effect of token frequency in PI in order to determine the role of token frequency with the German dative definite articles. While we wait for

future research to address these issues, it is clear that the processing-oriented approach, PI, is doing something that an output-oriented approach is not.

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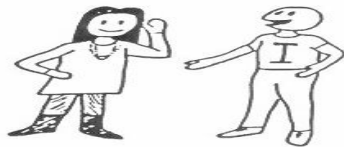
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APPENDIX A

SAMPLE MATERIALS

The following are sample referential SI items from the PI treatment packet. There were a total of three items of the first activity, eight of the second activity, and six of the third activity.

Activity 1 *Richtig oder Falsch*. Read the sentence and circle R (*richtig*) or F (*falsch*) to say whether the sentence correctly describes the picture or not.



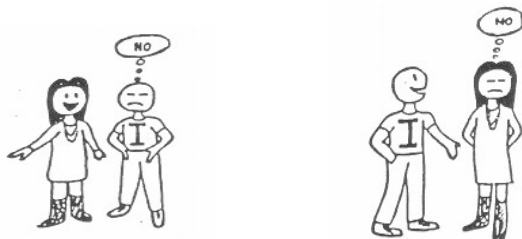
1. Die Frau antwortet

...dem Mann.

R / F

Activity 2 You will hear sentences in German. Select the picture that best corresponds with the sentence. Your instructor will review the correct answers with you after each question. In other words, you won't go on to number 2 until your instructor has reviewed number 1 with you.

1.



A

B

Activity 3 Select the best English translation of each sentence. Once you finish each question, your instructor will review the correct answer. In other words, don't go on to number 2 until your instructor has reviewed number 1 with you. When your instructor calls on you, answer "A" or "B".

1. Der Mann antwortet dem Mädchen.

A. The girl answers the man.

B. The man answers the girl.

The following are sample affective structured input activities from the materials packet for PI. There were a total of five items in the first activity, five items in the second activity, and eight items in the third activity.

Activity 1 *Wem hilfst du?* Answer yes or no to the following sentences, based on whom you help everyday.

1. Ich helfe...

...dem Bruder.

Ja

Nein

Activity 2 *Wem glaubst du?* When people tell you things, do you always believe them? Answer *immer* (always) *nicht immer* (not always) or *nie* (never).

Ich glaube...

1. ...dem Vater immer.

immer

nicht immer

nie

Activity 3 *Wem hörst du zu?* Who do you listen to when you want advice? Mark *Ja* or *Nein*.

Ich höre...

1. ...der Mutter zu.

Ja

Nein

APPENDIX B

SAMPLE MATERIALS

The following items are samples from the TI treatment packet. There were five items in Activity 1, five items in Activity 2, four items in Activity 3, three items in Activity 4, five items in Activity 5, six items in Activity 6, six items in Activity 7, and six example reasons for advice taking in the last section to be used in Activity 7.

Activity 1

Dative articles----Change the noun in parentheses to the dative form.

Model: Ich helfe _____. (Der Mann)

Ich helfe ___dem Mann___.

1. Du hilfst _____ (die Frau).

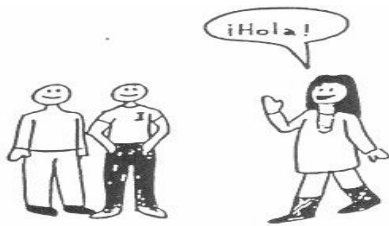
Activity 2 Nicht glauben. You and your friends don't believe these people. Complete the sentences with the dative. Say you don't believe the person in parentheses.

1. Ich glaube _____ nicht (der Mann)

Activity 3 Wem? (Whom?)

1. Wem hörst du zu? (der Mann) Ich höre _____ zu.

Activity 4 Complete the sentences with the dative form of the article in parentheses.



1. Das Mädchen sagt _____ (die Jungen) "Hallo".

Activity 5

Fill in the blank with the dative form of the article in parentheses.

1. Ich antworte _____ (die Frau).

Activity 6 Conversation A

When you need advice, whom do you listen to? Complete the conversation with a partner using the dative form of "the".

Model: die Polizistin

Student 1: Hörst du der Polizistin zu?

Student 2: Ja, ich höre der Polizistin zu/ Nein, ich höre der Polizistin nicht zu.

1. die Eltern

Activity 7 Conversation B

Now, use the vocabulary provided in Section B to explain *why* you take advice from the following people.

Model: die Polizistin

Student 1: Hörst du der Polizistin zu?

Student 2: Ja, ich höre der Polizistin zu. Sie hilft mir.

1. die Eltern

Section B

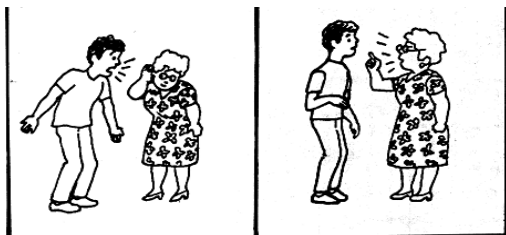
Er/Sie hilft mir. (*He/She helps me.*)

APPENDIX C

SAMPLE MATERIALS

Following are sample items from the interpretation and production tests. In the interpretation test, the sentences were read to participants, and translations were not provided. The interpretation sample appears first, followed by the sample production item.

1.



A

B

(Learners hear: *Der Frau antwortet der Mann.* The man answers the woman.)

Learners choose A or B.



1.

_____antwortet_____.
 _____. (Der Mann/Die Frau)

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Key Words

Input, output, processing instruction, input processing