Cue type	Gender of cues*	Test item	% correct
no cues	ØØ	*l'inguine* (m)	30
	ØØ	*l'uranite* (f)	44

*M=masculine; F=feminine; Ø=no gender marking
The first position indicates the syntactic cue in the article, while the second position indicates the morphophonological cue in the noun ending.

Appendix C

TEST 3
List of test items by cue type

Cue type	Gender of cues*	Test item	% correct
3 like cues (syn=sem=mp)	MMM	*Domenico è un vetraio distratto/distratta.*	100
	MMM	*Marco è un fabbro taciturno/taciturna.*	98
	MMM	*Tommaso è un calligrafo antipatico/antipatica.*	100
	FFF	*Laura è una centralinista bravo/brava.*	100
	FFF	*Lisa è una dattilografa svelto/svelta.*	100
	FFF	*Patrizia è una mondina povero/povera.*	100
2 like cues (syn=sem, mp=Ø)	MMØ	*Filippo è un falegname magro/magra.*	94
	MMØ	*Sergio è un bracciante allegro/allegra.*	98
	MMØ	*Vincenzo è un orefice preciso/precisa.*	97
	FFØ	*Alessandra è una custode grasso/grassa.*	97
	FFØ	*Angelica è una docente esperto/esperta.*	95
	FFØ	*Sofia è una preside nuovo/nuova.*	95
Cue discord (syn=sem≠mp)	MMF	*Alberto è un despota ricco/ricca.*	83
	MMF	*Franceso è un acquafortista innovativo/ innovativa.*	69
	MMF	*Carlo è un podista stanco/stanca.*	77
Cue discord (syn=mp≠sem)	FMF	*Antonio è una vedetta attento/attenta.*	67
	FMF	*Giorgio è una birba noioso/noiosa.*	67
	FMF	*Pietro è una recluta simpatico/simpatica.*	69
	MFM	*Marta è un soprano famoso/famosa.*	61
	MFM	*Rita è un architetto serio/seria.*	64
	MFM	*Tina è un diplomatico saggio/saggia.*	64

*M-masculine; F=feminine; Ø=no gender marking
The first position indicates the syntactic cue in the article, the second position indicates the semantic cue in the form of a person's name, and the third position indicates the morphophonological cue in the noun ending.

On Input Processing, Processing Instruction, and the Nature of Replication Tasks: A Response to Salaberry

Cristina Sanz and Bill VanPatten

We are pleased to have this opportunity to respond to M. Rafael Salaberry's article 'The role of input and output practice in second language acquisition' (*CMLR* 53:2). Because we believe he has misunderstood the nature of what has now come to be called 'processing instruction,' we feel obliged to comment.

As most readers are probably aware, processing instruction is a relatively new concept, and as VanPatten has said in his most recent work (VanPatten, 1996), we need to keep researching processing instruction before we jump on what can be called a 'processing bandwagon.' Moreover, the need for replication studies in a young field such as SLA is great, and so we were happy to see that our work on processing instruction had already started to be replicated. We underscore our enthusiasm for this development because we do not wish our comments on Salaberry's work to be viewed incorrectly as a defence of a weak position. Instead, our comments – largely critical – should be interpreted as part of professional discourse whose goal is to clarify and elucidate misunderstandings and misconceptions. Our comments are critical for two reasons. First, we believe there are a number of important misunderstandings of critical theoretical issues in both input processing and processing instruction that appear in Salaberry's work. Second, we find substantial methodological limitations in his work that render his conclusions invalid. Most important, we observe that Salaberry's study is not a replication of VanPatten and Cadierno (1993), Sanz (1994)[1] or VanPatten and Sanz (1995) and thus cannot speak to processing instruction as he claims. We will begin our comments with theoretical and conceptual issues.

Theoretical issues

Our discussion begins with a strong disagreement as to the meaning of the terms input processing and processing instruction. In chapter 3

of *Input Processing and Grammar Instruction in Second Language Acquisition* (1996), VanPatten shows that processing instruction is a psycholinguistically motivated focus on form that is *an adjunct to* communicative language teaching and/or to comprehension-based approaches. VanPatten argues that the equation 'processing instruction = comprehension-based approach' is reductionist and simplistic. As a matter of fact, VanPatten states explicitly that we know that comprehension-based approaches may not lead to internalization of some parts of the L2 grammar. We need some kind of focus on form that is consistent with the overall theory about the role of input in second language acquisition. Thus, processing instruction is not simply another comprehension-based approach to language teaching; it is a type of focus on form that serves to enhance comprehension-based approaches (e.g., immersion, the Natural Approach). We would also like to add that researchers in second language acquisition agree with the fundamental role of input in second language acquisition, and we refer Salaberry and other readers to Larsen-Freeman's and Long's (1991) summary discussion in their chapter on theories of SLA. It would seem that the people who disagree with the fundamental role of input in SLA are teaching methodologists (Musumeci, 1997).

Another major problem in Salaberry's review of processing instruction is a confusion between input processing as an aspect of SLA regardless of context and processing instruction as a classroom pedagogical tool. The first term (i.e., input processing) refers to a research domain about how learners make form-meaning connections as well as parse incoming sentences in the L2. It is, in a very real sense, the application of psycholinguistic inquiry to second language sentence comprehension and processing and is independent of pedagogical concerns. Informed by the Competition Model (Bates & MacWhinney) and other work in both child L1 and adult sentence processing, VanPatten's model of input processing is an account of intake derivation that occurs in working memory during on-line comprehension. In contrast, processing instruction is a focus on form that is motivated by the findings of input processing; it is erroneous to use the terms interchangeably or one for the other. The aim of processing instruction is to alter the less-than-optimal strategies for making form-meaning connections that learners take to the task of acquisition, something that we state very clearly in previous publications. That Salaberry consistently refers to input processing as a comprehension approach suggests that he has confused theory with pedagogy and we refer him and other readers to VanPatten (1995, 1996), Cadierno (1992), Sanz (1994), and Cheng (1996), where the theoretical underpinnings of processing instruction are discussed at length.

That processing instruction is motivated by a theory/model of input processing is important, since we believe it is one of the strengths of processing instruction. To repeat what we have said in previous publications, input processing is the information we have about how the L2 learner processes input to create intake. This information is couched in a set of processing principles that have been investigated empirically independently of instructional concerns. These principles in turn serve as the basis of the principles that characterize processing instruction. For this reason, we are able to state that processing instruction is learner or learning centred in that it takes into consideration independent evidence about acquisition as its starting point for the development of pedagogical approaches. VanPatten's model and the principles contained therein have also prompted us to choose specific linguistic items to carry out our research and to explain our results. We also note that Salaberry's article does not address VanPatten's model in any way. To ignore the model of input processing and the principles it contains leads to an inadequate discussion of any perceived inadequacies in processing instruction, rendering Salaberry's critique at best incomplete, at worst, misguided. Statements such as Salaberry's on page 425, 'there is no theoretical or empirical support,' (repeated on p. 427), and on page 424, 'the lack of clear theoretical description of L2 development to guide the choice of the linguistic structures to be taught – or how to teach them,' are consequently inaccurate.

The results of Salaberry's misinterpretation of both input processing and processing instruction are quite clear in comments such as 'input processing creates competence' (p. 423) and later on when he says that 'input processing leads to acquisition' (p. 426). We believe that a careful reading of our work would not allow for this kind of interpretation. Input processing is how learners create intake data. As discussed in considerable detail in chapter 2 of VanPatten (1996), the creation of intake data is not the same as the creation of competence, and acquisition is not equitable with input processing. It is clear to us that Salaberry's argument about the theoretical inadequacies of processing instruction is based on a faulty interpretation of both the nature of input processing and the nature of processing instruction.

Another area of confusion is his characterization of processing instruction activities. At one point, Salaberry equates the move from sentence-level activities to discourse-level activities in processing instruction with the move from mechanical to communicative practice, an entirely inaccurate portrayal of the structured input activities utilized in processing instruction.

Turning our attention from misrepresentation to misreading, we find it odd that Salaberry concludes that we do not believe in the role

of output practice in general language teaching. Our beliefs are clearly stated in VanPatten and Cadierno (1993) when we discuss the need for output activities in addition to input activities. In addition, in Lee and VanPatten (1995), two chapters are devoted to output-based activities with a clearly defined rationale for their inclusion in a communicatively oriented language teaching program. We do not advocate 'avoiding spontaneous production' (p. 427) at all, and we certainly do not advocate a communicative curriculum without chances to interpret, express, and negotiate meaning. Our conclusion upon reading these types of criticisms is that they must stem from a misunderstanding that processing instruction is a curriculum or a program for language teaching in and of itself. We repeat: processing instruction is a focus on form that serves to enhance what happens in communicatively driven classrooms; processing instruction is an adjunct to a communicative curriculum.

Upon several readings of Salaberry's work, it is not clear to us what the goal of his study was. On page 429 he states that the goal is to 'analyze the previously mentioned advantages of IP [*sic*] instruction.' If that is the case, we believe that he has completely missed the mark and we have already given some of the reasons why. However, given the title of his article and the space he devotes to discussing the role of output, we also think that his goal was to demonstrate that instruction that pushes learners to produce language has something to say about the development of the L2. This is certainly a very licit goal, and we think that more studies of this type should be done. We recognize the importance of recent work by Swain (1985) as well as that currently underway by Gass, Plough, and Fernández.[2] However, the literature and discussions with researchers actively pursuing the role of output in L2 development reveal that processing instruction and practice in making output are not mutually incompatible, theoretically or in practical terms. As a matter of fact, what Swain seems to claim is that having to produce pushes learners to attend to input data in ways that they might not normally do. And all the work on Long's Interaction Hypothesis says essentially the same. What this means to us is that eventually a complete model of second language acquisition and use must at some point address how learners attend to input data. In any event, as VanPatten has stated in other publications cited in the references in this response, acquisition and use of language involve at least three distinct sets of processes only one of which is output processing. At worst, what one can say about VanPatten's model of input processing is that it ignores output processing, something that can be investigated independently (see Schmidt, 1992). Our goal has been and continues to be to elucidate just one set of processes, input processing, and to examine its role in both theory building and application (e.g., pedagogy).

Methodological and research issues

We remind the reader that Salaberry's explicit goal is to analyze 'the previously mentioned advantages of IP [*sic*] instruction.' He then proceeds to describe what he calls a replication study. It is our contention that what he reports is not a replication study at all, and in this section we turn our attention to why it is not and what some of the problems are with the study he reports.

In replication studies, researchers isolate variables that could make a difference in results and systematically alter them to see if results are different. For example, if we take VanPatten and Cadierno as the 'original' study on processing instruction, then VanPatten and Sanz (1995) and Sanz (1994) are replication studies because they systematically altered the assessment tasks to address the issue of generalizability of the findings to more communicative tasks. Note that the instructional treatment did not change at all. In Cadierno (1995) and Cheng (1996), the issue of generalizability across linguistic items was addressed. Each researcher replicated the original study altering the linguistic item (e.g., verbal tense inflections, copular verbs, subjunctive mood). All other aspects of the study were left intact. Finally, VanPatten and Oikennon (1996) replicated the original study by isolating explanation from practice in processing input to address the question of the effects of explicit knowledge on assessment performance. Again, the original instructional treatment was used. What we are getting at – as we will detail below – is that Salaberry's study did not replicate VanPatten and Cadierno nor VanPatten and Sanz at all because there was no systematic and methodologically motivated change of variables. As far as we can tell, not much of the original VanPatten and Cadierno study was kept as a baseline for comparative purposes. Thus, any claims about processing instruction that Salaberry makes are suspect since his study differs in the following ways:

1. Salaberry did not use the original processing instruction[3];
2. Salaberry altered the nature of the assessment instruments in Sanz (1994). His interpretation task is not a sentence level task,[4] and the stimuli are written rather than aural[5];
3. The sentence level production task in the original studies was transformed into a paragraph translation task in Salaberry's work[6];

4. Salaberry's retell task suffered multiple changes that render it, too, suspect as part of a true replication study.[7]

One of Salaberry's interests lies in the effects that instruction has on different aspects of language use. Accordingly, his third hypothesis establishes a hierarchy of tasks in relation to expected differences in outcomes based on degrees of monitoring 'comprehension > production > narration'[8] ('from highest effect to lowest effect,' page 430). His only reference is Tarone (1988). Sanz (1994, 1996, 1997) has investigated the issue of assessment task design to measure the effects of instruction. Sanz provides extensive reviews of the literature on the use of assessment tasks as they have been used in SLA research and the criteria to construct them, including those that follow Tarone and her application of the Labovian paradigm, an important contribution to SLA. A closer reading of the references that appear in Salaberry's article show that Tarone, like Labov, tried to account for variation in production, and production only. Incorporating comprehension into her hierarchy only shows Salaberry's misinterpretation of Tarone's work as well as the concept of the monitor. It might be possible to establish a hierarchy of comprehension tasks that move from easier to more difficult (i.e., better to worse performance), however, that hierarchy would be theoretically unwarranted; that is, would be unrelated to the nature of variable rules which lies behind Tarone's approach to SLA. It is not surprising that Salaberry's study cannot provide support for his hypothesis.

On a related matter, Salaberry relies on Krashen's monitor to criticize both Sanz and VanPatten's and Sanz's tasks as allowing for monitor use. Salaberry does not explain why telling the subjects the number of events and allowing them to view the video twice allows for monitor use in the original studies. What is more, we do not see how his own task avoids such a limitation. We would like to draw the reader's attention to Sanz's work since it provides a way out of the 'They didn't monitor' 'Yes, they did' type of discussion. Based on psycholinguistic research on L1 and L2 production processes, such as Bialystok (1982), Cowan (1993), Levelt (1989), Robinson (1995), and Schmidt (1992), Sanz proposes two different criteria for the creation of tasks that allow for manipulation of the use of control versus automatic processes. Specifically, her results show that one of them, the amount of information that needs to be stored in short term memory, is a valid criterion for the design of assessment tasks, since it determines the amount of room that is left for use by controlled processes and consequently the use of explicit knowledge (and by extension the monitor) (see also Atkinson & Shiffrin, 1968). The other criterion is mode of production, that is, oral versus written, with oral tasks being more demanding than written tasks. Salaberry's study has failed to incorporate these two criteria in its design, resulting in notable impoverishment of its quality.

Along with the treatment and the assessment, the scoring procedure differs from the one used in the original studies, where a qualitative difference was made among types of errors on the sentence level production task: 1, .5, or 0 points were used depending on the degree of accuracy in the use of the critical item. In Salaberry's study, all errors were computed as 'a negative point' or -1 (page 432). This 'all or nothing' scoring procedure may fail to capture the partial effects of instruction, as VanPatten and Cadierno had pointed out in the original study. Finally, Salaberry's statistical analysis is problematic for several reasons. First of all, if hypothesis three on the differential effects of instruction according to assessment task had to be tested, a MANOVA should have been carried out instead of three different ANOVAs, one on data from each task. As it stands now, there could be a significant interaction between task and treatment that has gone unobserved. Second, but equally important, Salaberry states that repeated measures ANOVAs were performed on raw scores of the dependent variable. The problem is that the scores from the narration task are proportions: number of incorrect use divided by the cases of obligatory use created by each subject. These scores violate the ANOVA's assumption of normality and need to be transformed into radiants before they can be fed into the procedure. This was done both in Sanz's and in VanPatten and Sanz's studies, and we explained why the procedure needed to be done. That Salaberry did not attend to this important point means that the results of his ANOVA on the scores from the narration task are invalid.

In short, what Salaberry has done in this particular study is to alter so much that the results can no longer be directly compared to the previous research he claims motivates it.[9] Salaberry's study no longer addresses VanPatten's model of input processing nor the type of instruction derived from it *as it was developed in previous studies*. His findings may speak to something but not to his misconstrued inadequacies of our research.

Conclusion

We repeat here that our purpose in writing a response to Salaberry is to enhance the professional discourse related to processing instruction. We regret that we were not able to read Salaberry's work prior to its

publication, something that might have allowed us to make more positive comments at that time. We encourage replication studies, having conducted a number ourselves, however, we urge researchers to adhere to the basic tenets of replication studies. In so doing researchers can avoid the kinds of theoretical and methodological pitfalls we have pointed out in the study under discussion.

Cristina Sanz (PhD, SLATE, University of Illinois, Urbana-Champaign) is an assistant professor of Spanish linguistics and second language acquisition at Georgetown University. She has published several articles and book chapters on both input and production processes, as well as on Catalan sociolinguistics and on bilingualism.

Bill VanPatten is professor of Spanish and second language acquisition at the University of Illinois, Urbana-Champaign. He is the author of *Input Processing and Grammar Instruction: Theory and Research* (Ablex, 1996) and co-author, with James F. Lee, of *Making Communicative Language Teaching Happen* (McGraw-Hill, 1995).

Notes

1 The reference should be Sanz (1994) and not (1995) as it appears on p. 430 of Salaberry's article.

2 India Plough (personal communication March 9, 1997).

3 From what we can tell, based on the descriptions and the appendix, Salaberry did not use the original processing instruction. He developed his own materials which, upon close inspection, are not true processing materials. The reader will recall that processing instruction is motivated by the findings of input processing research and thus has very particular aims – to alter learners' processing strategies. We do not see that Salaberry's instruction did this in any systematic way as did previous research on processing instruction. We do not find that his instruction is informed in any way by the processing principles in VanPatten's model of input processing. From what we can tell, Salaberry also did not use the original traditional instruction that we used and so even his claims about output-based instruction cannot be compared with ours.

4 Because our research is motivated by sentence processing research in L1 studies, we used sentence level tasks in the original studies. That Salaberry did not stick with sentence level tasks may be due to his missing the point about what input processing instruction is and thus what processing instruction is.

5 Sanz (1994) and VanPatten and Sanz (1995) used four different assessment tasks, of which Salaberry claimed to replicate three. In the original interpretation task, the subjects had to choose between two drawings to demonstrate correct aural sentence interpretation. Salaberry's task is in fact a multiple choice exercise containing two subject pronouns and two direct object pronouns. Because his stimuli are written sentences, the subjects only had to look for the immediate antecedent contained in the sentence previous to the one containing the critical item (sometimes, the antecedent is right before the item) and match both for gender and noun. We do not see that his subjects would have had to process noun phrases as objects or subjects as in our task.

6 In Salaberry's version of the task, there are singular and plural pronouns instead of just singular forms (a confounding factor), and the subject is always the first person singular 'I.' Thus, Salaberry introduces a variable that was not present in the original studies, that of agreement between the NP in pre-verbal position and the verb.

7 His task is timed (5 minutes); we are not informed of the content of the film, number of events, or their nature, only the film duration.

8 We find this terminology confusing. The narration task is a production task just as much as the translation task is.

9 For other examples of replication and variable isolation, the reader might wish to peruse the literature in cognitive psychology and psycholinguistics and compare how replication is performed there with what Salaberry has done here.

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