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Ambient input, instructed input, and absent input: A reflection on L2 acquisition in different input conditions

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Abstract

In the second language (L2) acquisition context, *poverty of the stimulus* is defined as a situation where neither incidental input nor instruction provide direct evidence for a particular property in the L2. Research has shown that L2 acquisition is nonetheless possible in such conditions, even when the L2 speakers' first language differs from the L2 in the relevant respect. In other words, L2 properties can (in some cases) be acquired despite the absence of direct evidence in the input for the given property. However, even when direct evidence of an L2 property is available through ambient input or instruction, research findings—along with the personal experiences of many L2 learners—show that acquisition of that property does not always proceed as might be anticipated. This paper reflects on how acquisition proceeds in light of ambient input, instructed input, and absent input, and identifies a key commonality in the role of input, regardless of the input context. The paper draws on data from a range of studies, with a focus on work by the present author on L2 acquisition in Japanese, Korean, and German.

要旨

1 Introduction

The role of input in second language (L2) acquisition has been a topic of fundamental importance in L2 acquisition research for many decades, from a range of perspectives. An early, key proposal about L2 acquisition, Krashen's (1985) Input Hypothesis, reflects this importance in its name. This hypothesis proposed that L2 acquisition will occur subconsciously if a learner is exposed to comprehensible linguistic input that is just a step ahead of their current state of development, provided that the learner is also positively disposed to learning (which

Krashen termed having a "low affective filter"). The Input Hypothesis, directly and indirectly, has influenced a vast amount of research into input from both applied and theoretical perspectives (Lichtman & VanPatten, 2021). On the applied language learning side, the Noticing Hypothesis (Schmidt, 1990) counter-argued that exposure to comprehensible input is not enough, and that learners need to consciously process (i.e., notice) relevant linguistic data in order for acquisition to take place. Such a view underpins proposals about ways of facilitating conscious processing in the classroom, such as input enhancement (Sharwood Smith, 1991), or input processing instruction (VanPatten & Cadierno, 1993; VanPatten, 1996). On the language acquisition theory side, input is fundamental in the two key approaches, emergentism and nativism. In an emergentist (or usage-based) framework, language acquisition is explained in terms of properties of the input, such as the frequency or reliability of linguistic cues. (See Ellis, 2002, 2006, for overviews.) In a nativist (or generative) approach, acquisition arises as a result of the interaction of input with an innate set of linguistic principles, Universal Grammar (UG: Chomsky, 1986). The nativist approach argues that, while input is essential, it is not enough on its own, on the grounds that, in first language (L1) acquisition, some of the linguistic knowledge that arises cannot logically be induced from the input: a situation known as the poverty-of-the stimulus problem. UG was proposed as the mechanism that bridges the gap between the input and ultimate L1 knowledge. (See Slabakova et al., 2014; Whong et al., 2013 for outlines of the generative approach in L2 acquisition, and Section 2, below, for examples of its application). In short, in both emergentism and nativism, the role of input shapes the theories themselves.

Following my plenary talk at the 2021 conference of the Japan Second Language Association, the present paper explores the role of input in areas of L2 acquisition that my own research has focused on. I will focus on three facets of input that map onto the themes mentioned above. Specifically, Section 2 focuses on absent input, drawing on the nativist, poverty-of-the-stimulus concept. Section 3 focuses on ambient input, in the sense of incidental, naturally occurring input, which we could associate with Krashen's comprehensible input. Finally, Section 4 focuses on instructed input. The paper concludes by reflecting on commonalities in the role of input across the three different input contexts.

2 Absent input

Poverty of the stimulus was originally defined for first language (L1) acquisition as a situation where "[p]eople attain knowledge of the structure of their language for which no evidence is available in the data to which they are exposed as children" (Hornstein & Lightfoot, 1981, p. 9). In L2 acquisition, two additional sources could provide evidence of a given structure, in addition to evidence in the incidental input: namely, the L1 grammar, and classroom instruction. If the linguistic structure in question is the same in a learner's L1 as in their target L2, then there is no L2 poverty-of-the-stimulus problem, since the relevant knowledge could transfer from the L1 grammar. If the linguistic structure is a topic of classroom instruction

(which is, of course, a specialized form of input), then, again, there is no L2 poverty-of the-stimulus problem. Thus, an L2 poverty-of-the stimulus problem is a target language property that is under-determined by the input, by the L1 grammar, and by classroom instruction. The present section reports on two such properties in L2 Japanese by L1-English speakers: quantifier scope interpretation (Marsden, 2009) and numeral quantifier interpretation (Kume & Marsden, 2021).

2.1 Quantifier scope interpretation in L2 Japanese

Marsden (2009) identified acquisition of Japanese quantifier scope interpretation as a poverty-of-the-stimulus problem for L1-English-speaking learners of Japanese. Specifically, the study focused on an interpretive contrast between English and Japanese in sentences containing two quantifiers. In an English sentence such as (1), while a subject-wide scope interpretation (S>O, as in 1a) is generally readily available, an object-wide scope interpretation (O>S, 1b) is also typically available, if somewhat dispreferred (e.g., May, 1977).

(1) Someone stroked every cat.
   a. S>O interpretation: There is some person such that that person stroked every cat.
   b. O>S interpretation: For each cat, some person stroked the cat (possibly a different person for each cat).

By contrast, in an equivalent sentence in Japanese, the O>S reading is argued to be unavailable (and not merely dispreferred) in sentences with canonical word order (2a), but it becomes possible when the word order is scrambled (2b) (Hoji, 1985; Kuno, 1973; Kuroda, 1970). (Two morphemes contribute to the universal quantifier used in (2): *dono* "which" and -mo "also". Together, these are glossed as "every". See Nishigauchi (1990), among others, for further details.)

(2) a. Dareka-ga dono neko-mo nadeta — Interpretation: S>O, *O>S
   Someone-NOM every cat stroked
   "Someone stroked every cat."
   b. Dono neko-mo dareka-ga nadeta — Interpretation: S>O, O>S
   Every cat someone-NOM stroked
   "Someone stroked every cat."

Assuming that L1 knowledge transfers to the L2 grammar, then L1-English learners of Japanese would be predicted to allow an object-wide interpretation of sentences like (2a) on the basis of their L1 grammar. In principle, this L1-based grammar could be changed, if evidence from the input motivated such change. However, Marsden (2009) reasoned that the input would be very unlikely to contain evidence that an object-wide scope interpretation is *not* available, on the grounds that the linguistic input we encounter (i.e., everyday speech and text) shows what *can* happen in language, not what cannot happen. Classroom instruction may, in

principle, provide information about what cannot happen (i.e., negative evidence), but examination of Japanese textbooks along with conversations with Japanese language teachers confirmed that instruction about the absence of object-wide scope in canonical sentences such as (2a) is not included in typical Japanese language teaching.

This study, then, investigated whether, despite the absence of input, L1-English learners of Japanese could acquire the knowledge that Japanese doubly-quantified sentences with canonical word order, such as (2a), lack an object-wide scope interpretation. A picture–sentence match task was used, in which participants saw pictures depicting either the subject-wide or the object-wide interpretation of a sentence (Figure 1), together with the written sentence, and they had to indicate whether the sentence matched the picture.

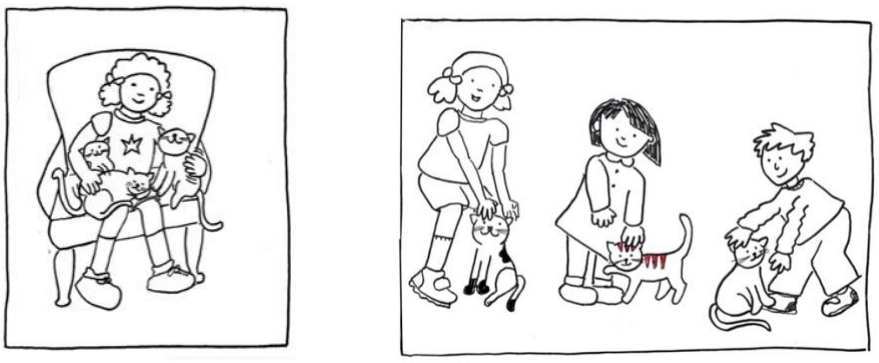

Figure 1. Sentence-picture match task pictures representing S>O (left) and O>S (right) scope interpretations for *Dareka-ga dono neko-mo nadeta* "Someone stroked every cat"

The findings showed that, out of 31 intermediate–advanced L1-English learners of Japanese, just nine (29%) behaved in a target-like way, in the sense that they rejected object-wide scope to the same degree as native Japanese speakers did. The other participants had higher rates of non-target-like acceptance of object-wide scope. This behaviour contrasted with a comparison group of L1-Korean speakers of Japanese, who tended to reject object-wide scope. Korean is similar to Japanese in terms of quantifier scope interpretation: Korean sentences equivalent to (2a) do not allow an O>S interpretation (Hoji, 1985; Kim, 1989). Taken together, the different results by L1-English and L1-Korean speakers of Japanese provide evidence of the L1 grammar influencing L2 scope interpretation. This led to target-like behaviour in the L1-Korean group but over-acceptance of object-wide scope in the L1-English group. However, the fact that nine individuals within the L1-English group nonetheless correctly rejected object-wide scope shows that acquisition is possible despite the absence of input. This raises the question of how? Before addressing this question, I present a second poverty-of-the-stimulus study.

2.2 Definiteness and floating numeral quantifiers in L2 Japanese

Kume and Marsden (2021) report on another investigation of L2 Japanese acquisition by high-intermediate or advanced proficiency speakers whose L1s were English or Korean. (This investigation formed part of a larger study by Kume, 2021). The investigation focused on an interpretation contrast between postnominal and floating numeral quantifiers (NQs), illustrated in Table 1.

Table 1. Availability of definite/indefinite interpretations in different NQ types

Numeral quantifier type	**Definite interpretation:** "the three apples"	**Indefinite interpretation** "three apples"
Postnominal NQ		
…ringo-san-ko-o… …apple-3-CL-ACC…	✓	✓
Floating NQ		
…ringo-o san-ko… …apple-ACC 3-CL…	✗	✓

The NQ in Table 1 is *san* "three" followed by the classifier for small objects, *-ko*. In the postnominal NQ structure, where *san-ko* immediately follows the noun that it quantifies, the phrase can have either a definite or an indefinite interpretation. However, in the floating NQ structure, where *san-ko* occurs after the noun and its case particle, only an indefinite interpretation is available (Watanabe, 2006; among others). Acquisition of this more restricted interpretation of floating NQs is a poverty-of-the-stimulus problem for L1-English learners of Japanese, by the same logic as argued for quantifier scope interpretation in the previous study. The learners' L1 has no definiteness restriction on numeral quantifiers, therefore transfer from the L1 grammar would allow a (non-target-like) definite interpretation for Japanese floating quantifiers. Neither everyday input nor classroom instruction provides evidence that a definite interpretation does not obtain. In contrast to English, Korean numeral quantifier structures are similar to Japanese, and Korean floating NQs, like Japanese, are restricted to indefinite contexts (e.g., Lee, 2013), which means that transfer from Korean would facilitate target-like interpretations in L2 Japanese.

The study used a context-based judgement task to investigate whether L1-English-speaking learners could acquire the incompatibility of floating NQs with definite contexts, despite the absence of input. An example test item using a floating NQ is given in (3):

(3) *Preamble* (presented in Japanese in the experiment):
Taroo is a good tennis player. He had tennis matches with his friends, Takasi, Hirosi and Goroo, yesterday.

Sentence for judgement:
Taroo-wa itumono yooni yuuzin-o san-nin kantanni sugu makasite-simaimasita
Taroo-TOP always like friend-ACC 3-CL easily quickly beat-finished
Intended meaning: "He, as always, beat the three friends easily and quickly."

The preamble to the sentence for judgement creates a context for a definite interpretation of the numerally-quantified noun, but the floating NQ in the sentence for judgement is incompatible with this definite context. The results showed that a native Japanese control group and the L1-Korean L2-Japanese group gave lower ratings for floating NQs in definite contexts than in indefinite contexts. For the L1-English L2-Japanese group, the pattern was less clear but individual analysis showed that almost half of the participants exhibited target-like interpretations. In short, as in the previous study, the results show L1 influence on L2 interpretation, and evidence of acquisition despite the absence of input, by at least some of the L1-English L2-Japanese participants.

2.3 How does acquisition proceed despite the absence of input?

The studies outlined above, along with a number of other studies on different languages and different phenomena (e.g., Dekydtspotter et al., 2001; Heil & López, 2020; Marsden, 2008), provide evidence that some L2 acquisition can take place even in the absence of input. Such results have been used to argue that innate linguistic knowledge, or UG, is operative in L2 acquisition, on the grounds that, if external evidence for an attested property is absent, then knowledge of that property must arise through internal mechanisms. However, it is important to avoid the misunderstanding that positing innate linguistic knowledge means that input is irrelevant, or that UG might contain information specific to a given language, such as information about Japanese quantifier scope or floating NQs. On the contrary, input is still essential even if UG is involved, and UG cannot contain information specific to a given language, precisely because it is posited to be universal. The question of how acquisition proceeds in any given L2 poverty-of-the-stimulus situation must be addressed case by case. For quantifier scope interpretation, Marsden (2009) argued—drawing on theoretical research into quantifier scope by Beghelli (1997), among others—that cross-linguistic differences relating to the number feature on universal quantifiers plays a role. In brief, the English quantifier *every* is always [+singular] but the Japanese *dono…-mo* "every" can be singular or plural (i.e., [±singular]). If L2 learners can acquire the [±singular] value of *dono…-mo*, then the availability of object-wide-scope is automatically ruled out through the universal syntactic computation (see Marsden, 2009, for full details). Evidence that Japanese distributive quantifiers can be plural is potentially available in the ambient input in Japanese, so if learners encounter and process such input, then the restriction on scope interpretation will automatically apply, even though evidence of the restriction on scope interpretation itself is not available.

Turning to floating numeral quantifiers, Kume and Marsden (2021), drawing on theoretical linguistic research by Kobuchi-Philip (2007), suggested that the morphological status of

Japanese numeral quantifiers as compound nouns may play a role in the relationship between floating numeral quantifiers and definiteness. If this suggestion is correct, then as long as learners can acquire that numeral quantifiers are compound nouns comprising a numeral and a bound morpheme classifier—unlike comparable quantifier phrases in English, such as *three cups* in *three cups of tea*—the incompatibility of floating numeral quantifiers with a definite interpretation should arise automatically from the universal syntax-semantic computation (see Kume & Marsden, 2021, for more detail). Evidence that Japanese numeral quantifiers are bound morphemes is arguably present in everyday Japanese input and in classroom instruction. Thus, processing of such input could motivate the relevant grammar restructuring in relation to Japanese numeral classifiers which, in turn, would lead to the target-like interpretation of floating numeral quantifiers seen in a subset of the L1-English participants in the experiment.

The answer to the question of how acquisition proceeds despite absent input, then, is that input is always involved, but the relevant input in these cases is not direct evidence of the specific property in question. Rather the necessary input may relate to a different property whose grammar is implicated in the underlying structure of the target property (e.g., acquisition of the bound-morpheme status of Japanese numeral classifiers). If that property is acquired, it interacts with the unconscious syntactic computation mechanisms to bring about other effects found in the target language.

3 Ambient input

The previous section illustrated cases where L2 acquisition took place despite the absence of directly relevant input. However, it is well known that a contrasting situation exists, where acquisition does not seem to take place, despite the availability of input (and despite the learners being appropriately disposed to learn). A criticism of Krashen's Input Hypothesis was that it did not account for such cases (Gor & Long, 2009). This section provides a recent example from a study in collaboration with Kook-Hee Gil and Sunyoung Park on acquisition at the interface of morphosyntax and prosody in L2 Korean, (Gil et al., 2021).

This study focuses on bare *wh*-words in Korean, which can be interpreted either as *wh*-interrogatives or as existential quantifiers. This potentially leads to ambiguity, as illustrated in (4):

(4) Minswu-nun mwues-ul masyesse-yo
Minsoo-TOP what-ACC drank-PARTICLE
a. Wh-question: "What did Minsoo drink?"
b. Yes-no question: "Did Minsoo drink anything/something?"
c. Declarative: "Minsoo drank something."

The sentence in (4) can have three different interpretations: a *wh*-question interpretation where the *wh*-morpheme *mwues* expresses "what"; a yes-no question interpretation where *mwues*

means “anything” or “something”; and a declarative interpretation where *mwues* means “something”. Of course, context may disambiguate among these three interpretations, but in the absence of context, intonation can also disambiguate. In *wh*-questions (4a), the *wh*-word often receives a high pitch accent, followed by a falling prosodic contour at the end of the sentence (Jun & Oh, 1996; Yun, 2019). By contrast, yes-no questions tend to have a rising prosodic contour at the end of the sentence, and no high pitch accent on the *wh*-word (Lee, 1997). In declaratives, there is neither high pitch accent on the *wh*-word nor a rising contour at the end of the sentence (Yun, 2019). None of the three meanings of sentences such as (4) is obscure: all are likely to occur, with the appropriate prosody, in input that learners of Korean are exposed to. This means that L2-Korean learners could, in principle, acquire the prosodic disambiguation of bare *wh*-morphemes through observable ambient input.

Gil et al. (2021) investigated L2 acquisition of Korean prosodic disambiguation in three different L1 groups: L1-Mandarin, L1-Japanese, and L1-English. The three groups all differ from each other, and from Korean, in terms of *wh*-word morphology and/or prosody. In terms of morphology, Mandarin is similar to Korean: bare *wh*-morphemes in Mandarin can function both as *wh*-pronouns in *wh*-questions and as existential quantifiers in yes-no questions. These two question forms are often differentiated by a question particle: *ne* in *wh*-questions and *ma* in yes-no question. However, when question particles are absent, prosody can disambiguate. Mandarin has prominent pitch on *wh*-words in *wh*-questions but not in yes-no questions. Contrasting with Korean, Mandarin typically has a rising intonational contour in both *wh*-questions and yes-no questions (Hsu & Xu, 2019; Hu, 2002). (There is no declarative interpretation for Mandarin sentences such as (4).)

Japanese also makes use of *wh*-morphemes in *wh*-pronouns and existential quantifiers, but in the latter, the *wh*-morpheme is not bare; it takes a suffix. For example, the form *dare* means “who”, while *dare-ka* means “anyone/someone”. Thus, morphology reliably differentiates between *wh*-questions and yes-no questions in Japanese. In terms of prosody, Japanese is similar to Mandarin: both question types have a rising pitch contour, and the *wh*-question – but not the yes-no question – has a high pitch accent on the *wh*-word (Deguchi & Kitagawa, 2002; Kitagawa, 2007). Finally, English is entirely different from the other three languages in terms of morphology, because existential quantifiers do not make use of *wh*-morphemes at all. However, the intonation in English questions is arguably more similar to Korean, with yes-no questions typically having a rising prosodic contour and *wh*-questions a falling prosodic contour (Wells, 2006).

Given these crosslinguistic differences, the study tested two alternative hypotheses:

(5) a. Influence from L1 morphosyntax:
If L1 morphosyntax influences L2, then Korean bare-*wh* interpretation may be easier to acquire for L1-Mandarin (and L1-Japanese) speakers than for L1-English speakers

b. Influence from L1 prosody:

> If L1 prosody influences L2, then Korean bare-*wh* interpretation may be easier to acquire for L1-English speakers than for L1-Mandarin and L1-Japanese speakers

The rationale for the first hypothesis (5a) is that, since Mandarin, and to some extent Japanese, have *wh*-words that serve as both *wh*-interrogatives and as *wh*-existentials, L1-Mandarin (and L1-Japanese) speakers may be more sensitive to the need to identify other linguistic factors that determine the meaning than L1-English speakers, for whom the distinct forms for *wh*-interrogatives and existential quantifiers in the L1 grammar do not motivate seeking beyond the morphology for meaning. The rationale for the second hypothesis (5b) is simply that English appears to have the same use of sentence-final rising intonation in questions as Korean does (i.e., only in yes-no questions), whereas Mandarin and Japanese use sentence-final rising intonation in both question types. Hence, influence from L1 prosody may be more facilitative for L1-English speakers than for the other two groups.

Three groups of mid- to high-intermediate-level L2 Korean speakers participated in the experiment, with Mandarin, Japanese or English as their L1. All were living in Korea at the time of data collection or had recently lived there, so all had had experience of natural exposure to Korean. The test instrument was a listen-and-translate task (partially replicating Choi, 2009), which included 10 questions with the form in (4), five with *wh*-question intonation and five with yes-no question intonation. They wrote translations of the questions in their L1, and the translations were then coded for sentence-type, as "*wh*-question", "yes-no question", "declarative", or "other".

The results showed that, overall, all three L2 Korean groups tended to interpret the utterances as *wh*-questions, regardless of intonation. However, there were differences between the groups in terms of the percentages of non-target *wh*-question translations of the yes-no question items: 62% in the L1-English group, 73% in the L1-Mandarin group, and 89% in the L1-Japanese group. The percentages of correct yes-no translations were almost the inverse of this. Mixed-effects modelling confirmed that L1-English speakers were statistically more likely than either L1-Mandarin or L1-Japanese speakers to provide a yes-no question translation in the yes-no question condition; and L1-Mandarin speakers were more likely than L1-Japanese speakers to do so. Analysis of individual response patterns showed that just 21% of the L1-English speakers, 6% of the L1-Mandarin speakers, and none of the L1-Japanese speakers had a response profile that matched that of a native Korean control group. Gil et al. interpreted these findings as showing tentative support for the L1 prosody influence hypothesis (5b): the prosodic similarity between English and Korean seemed to facilitate acquisition of Korean prosodic disambiguation, though acquisition of this property is very difficult.

In the context of the present paper, what is of key interest is the relatively low rate of acquisition (≤38%) of the yes-no question prosody across the three groups. It is reasonable to assume that all participants in the study had had many opportunities to hear yes-no questions in the Korean input they had been exposed to. The findings thus illustrate that evidence in the ambient input does not necessarily lead to acquisition. This has been seen previously with many other grammatical phenomena for which evidence is abundant in the input, including L1-

English speakers' acquisition of certain usages of the Japanese topic and subject-case particles *-wa* and -ga (as summarized in Russell, 2004) and of English articles by speakers with a range of L1s (e.g., Lopez, 2015; Master, 1997). The present case, focusing on the prosody–morphosyntax interface in L2 Korean, provides a novel example of low acquisition success despite ambient input, alongside these more well-known cases.

4 Instructed input

A solution to the difficulties in acquiring particular L2 properties could potentially be found in language instruction. It goes without saying that the language classroom is a crucially important source of input for most classroom language learners. A vast body of research over decades has focused on investigation of how to optimize classroom input so that maximum learning gain can be produced within the relatively limited classroom time. One method that has yielded promising results is processing instruction (VanPatten & Cadierno, 1993; VanPatten, 1996). This section focuses on research that makes use of this method.

Processing instruction is rooted in Input Processing Theory (VanPatten, 1996), which holds that abstract grammatical representations are built when a learner processes and comprehends the connection between meaning and its grammatical encoding. In the processing instruction approach, explicit instruction on the target grammatical property is typically given, and then learners engage in exercises designed in such a way that comprehension of the target grammatical form is essential to completing the exercise successfully. An example is Benati's (2015) application of processing instruction to passives in L2 Japanese. Participants were given explicit metalinguistic instruction that highlighted the passive agent marker *-ni* and the passive verbal morphology. The participants then completed a series of practice tasks that were designed to require processing of the passive morphology. For example, one task included hearing sentences such as (6a) and then selecting a matching description from the English options in (6b) (Benati, 2015, p. 145; Hikima, 2006, 2010):

(6) a Yoshiko-chan-wa keki-wo kuma-kun-ni tabe-rare-masita
Yoshiko-*chan*-TOP cake-ACC Kuma-*kun*-by eat-PASS-PAST
"Yoshiko's cake was eaten by Kuma."

b. ☐ Yoshiko ate Kuma's cake ☐ Kuma ate Yoshiko's cake

The correct option (*Kuma ate Yoshiko's cake*) can only be identified by processing and comprehension of the agent marker along with the verbal morphology. During the practice tasks, participants received feedback on whether their responses were correct or not. Benati reports that participants who received the processing instruction performed significantly more accurately in immediate and delayed post-tests of passive knowledge relative to their pre-test performance, and relative to the post-test performance of a control group that did not receive training on passives.

Other studies have compared processing instruction with other types of instruction (often "traditional instruction") and have often found processing instruction to yield the same gains or greater gains than the other method (VanPatten, 2012). The remainder of this section will briefly outline a study in progress that also uses processing instruction and whose preliminary results are relevant to the goals of the present paper in terms of the effect of processing instruction but also in terms of the performance of the control group that did not receive instruction.

The study in question investigates L2 acquisition of accusative case and word order in German (Marsden et al., in progress). The teaching intervention provided explicit instruction about the role of the German accusative-marked determiner (*den*) in identifying the object of an active sentence, particularly in the noncanonical scrambled word order illustrated in (7b) contrasting with the subject-first word order in (7a).

(7) a. Der Affe begrüsst den Panda
the.NOM monkey greets the.ACC panda
"The monkey greets the panda."

b. Den Affen begrüsst der Panda
the.ACC monkey greets the.NOM panda
"The panda greets the monkey." ("It's the monkey that the panda greets.")

Following the instruction, participants completed a series of exercises in which, as in the Benati (2015) example above, processing and comprehension of the target property—in this study, the case-marked determiner—was essential to getting the right answer in each exercise. Feedback was provided about whether the answers were correct or wrong. Another set of similar exercises was completed the following week, prior to the first post-test. The pre- and post-test measures included a comprehension test and an oral production test. Initial analysis of the results suggests that the participants who received the input processing instruction made large gains from the pre-test to the immediate post-test, and that these gains were sustained at a delayed post-test. However, the control group, which received no training on case processing, also made gains in both comprehension and production, though this group's gains were considerably smaller than in the group that received instruction.

Analysis of these results is ongoing, but they suggest further evidence of the efficacy of training that promotes processing and comprehension of the connection between grammatical form and meaning. Of particular relevance to the present discussion are the small but clear gains made by the control group. It appears that, just through engagement with the test instruments, this group's comprehension and production of scrambled German sentences such as (7b) improved. It is worth recalling that, in terms of a learner's experience, completing language tests in an experiment is similar to completing language practice exercises. The experimental tests provide repeated exposure to a target property (though usually mixed in with filler stimuli that should minimize awareness of the target). In a sense, these tests themselves could serve as a type input flood, which is an input enhancement method, whereby the input is

manipulated so as to increase the frequency of a given structure with the aim of facilitating noticing, and then acquisition, of that structure (Wong, 2005). Input flood has been shown to produce learning gains, though in most studies that investigate input flooding, it was more effective used in conjunction with explicit instruction and/or targeted practice (Hernandez, 2011, 2018). It is not typically the case that a control group in a teaching intervention study responds to the experimental tests as if to an input flood, with corresponding learning gains. Benati's (2015) control group, for example, did not improve across the pre-test and the two post-tests. A factor that could explain the susceptibility of Marsden et al.'s control group to an input flood effect is that case-marked determiners were not new for any of the participants in this study. All participants had been taught about case and determiners earlier in their German language education, so the teaching intervention (for the group that received it) was a form of review. This could have led to the control group participants being receptive to the form, on encountering it in the test instruments. By contrast, in Benati's (2015) study (and many others), the participants were encountering the target grammatical form for the first time. These preliminary findings will be presented in full, and their implications explored in detail, in Marsden et al. (in progress). To summarise the current section: the studies reported provide evidence that instructed input in the form of processing instruction, and possibly also in the form of input enhancement by means of input flood, can lead to learning gains.

5 Concluding discussion

The preceding three sections have looked at L2 acquisition research in three different input contexts—absent input, ambient input, and instructed input—and presented representative studies for each. Absent input referred to poverty of the stimulus: situations in which there is no direct evidence for a given target property in ambient or instructed input, or via the L1 grammar. The studies reported looked at L2 acquisition of Japanese quantifier scope and Japanese floating numeral quantifiers, and both found evidence of successful acquisition by a minority of advanced L2 speakers, despite the absence of direct input. The second context, ambient input, referred to situations in which evidence for a given property is available in the input. The illustrative study, on L2 acquisition of prosodic disambiguation of *wh*-words in Korean, showed that despite evidence in the ambient input, this property is not readily acquired by L2 speakers, though there was some variation by L1, which may be due to L1 transfer effects. Finally, instructed input refers to input provided via language teaching. The section reported on evidence of learning gains produced through processing instruction, but also highlighted incidental gains by a control group that received no instruction or practice but was exposed to what could be called an input flood, via the pre- and post-test materials.

The different studies that were highlighted across the three input contexts cannot be directly compared, because of the very different goals of the studies and consequently different linguistic properties and L2 populations. Nonetheless, for the purpose of the current discussion, we will consider the picture of the relationship between input and acquisition that emerges

from this set of studies. Notably, in the instructed input studies, the groups that underwent a processing instruction intervention made clear learning gains. The interventions involved a considerable amount of active, conscious practice in processing and comprehension of the target grammatical forms. In all of the other input contexts considered, there was no such practice in relation to the target forms: not even in the case of the control group in the German study, because the practice afforded by the test instruments in this case was not consciously undertaken as training on German case.

In contrast to the intensive processing practice experienced in the processing instruction interventions, opportunities that require processing and comprehension of the properties that were the focus of the absent input and ambient input studies are, arguably, rare. For example, in the context of Korean prosodic disambiguation, although evidence of Korean question prosody should occur frequently in the input that L2 Korean learners are exposed to, there may be few cases in which a learner *must* attend to the prosody in order to avoid misunderstanding, because context often disambiguates. Moreover, even when cases arise where attention to the prosody is essential, the learner may not always notice: they may simply apply an interpretation—most likely a *wh*-question interpretation, according Gil et al.'s experimental results—without realizing that in some cases that interpretation is wrong, because, outside the context of targeted practice, learners do not necessarily receive feedback on a wrong interpretation or a mistake. Similarly, in the two absent input cases, the evidence relevant to acquisition (indirect evidence relating to the target properties, in these two cases) may not necessarily be attended to when it happens to occur in the input. In short, opportunities for processing and comprehending the connection between meaning and its grammatical encoding in the absent input and ambient input situations are sparse and probably spread out over a long period, instead of being frequent and consolidated into a short time as in the instructed input situation. This difference offers an explanation for why very few individuals had acquired the absent input and ambient input properties: it takes a long time before enough relevant input to motivate acquisition is both encountered and meaningfully processed.

To conclude, I contend that the process for acquisition is the same, whether in the context of an instructed input processing intervention or in a context that is dependent on incidental input. In both cases, in line with Input Processing Theory, comprehension and processing of the relevant input must occur. When that input is potentially infrequent, incidental, and liable to pass unawares in many cases, then the procedure could be termed "slow processing practice", as opposed to the intensive processing practice that takes place during processing instruction. The findings from the absent input and ambient input studies of successful L2 acquisition emerging in subsets of more advanced learners suggest that slow processing practice takes place at its own rate, in any environment where L2 input may be available.

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