

# A Test Case for L1 versus UG as the L2 Initial State: The Acquisition of the Scope Properties of Disjunction by Japanese Learners of English

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## 1. Introduction

The extent to which knowledge provided by the language faculty, or UG, is available to second language (L2) learners has been the subject of extensive debate. Recent empirical work has shown that fully fledged grammatical representations must be available to the L2 learner even at the initial state (see e.g., Dekydtspotter et al., 2005; Bohnacker, 2006; Grüter & Conradie, 2006). The exact source of this knowledge, however, has not been clearly determined. In this paper, we contrast and test two hypotheses: (i) at the initial state of L2 acquisition, the learner draws on a grammar that has been transferred in its entirety from the L1, and (ii), the initial state L2 learner draws on knowledge provided by UG directly, without ‘detour’ via the L1. We will refer to the first hypothesis as ‘Full Transfer’, a position taken by advocates of a number of otherwise divergent theories of L2 acquisition (e.g., Bley-Vroman, 1990; Schwartz & Sprouse, 1994). Hypothesis (ii), a stance taken by Epstein, Flynn & Martohardjono (1996), will be referred to as ‘Full Access without Transfer’ (following White, 2003). As noted by Epstein et al. (1996: 684), “any empirical distinctions between an account that attributes to L2ers ‘UG-specified knowledge’ and one that attributes ‘UG-specified knowledge *via the L1*’ are extremely subtle.” In this paper, we present an empirical study of a context where such distinctions are expected to emerge, namely the acquisition of the scope properties of disjunction by Japanese learners of English.

We begin with a discussion of the two hypotheses at stake, and their general predictions (section 2). This is followed by a presentation of the relevant cross-linguistic variation, i.e., the interpretation of disjunction in sentences containing negation (section 3), as well as a review of previous work investigating these properties in L1 acquisition (section 4). In section 5, we present our own experimental study, which, as far as we know, constitutes the first investigation of these properties in second language acquisition.

## 2. Hypotheses and general predictions

The general predictions of the Full Transfer hypothesis are straightforward. With essentially the grammar of the L1 at his disposal, the initial state learner is predicted to approach an L2 with the values, settings and preferences of the L1. In other words, the initial value for any property of the L2 is predicted to be the (final) value of the learner’s L1.

The predictions that arise from the Full Access without Transfer hypothesis, on the other hand, are somewhat less clear, nor are they explicitly discussed by the proponents of this approach. It seems, however, that if we assume that the L2 learner is informed by the language faculty directly, without

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intervening effects of the L1, the situation is much the same as in L1 acquisition. Thus substantial parallelism is expected between the initial assumptions of L1 and L2 learners. Indeed, Epstein et al. (1996) adduce evidence of this kind. For example, they observe that L1 learners of English have an early preference for interpreting all control verbs as object control, and proceed to cite studies purportedly showing a similar preference in early L2 learners (but see Schwartz, 1996: 740 for a critique of this evidence). Epstein et al. (1996: 690) conclude that “these comprehension studies found no evidence that the L2ers attempted to ‘translate’ or to ‘map’ their native language structures onto those of the L2 even when the L1 would have provided a correct response for the English structures tested.” Given this line of argument, it appears reasonable to assume that under the Full Access without Transfer hypothesis, the prediction is that early interpretive preferences in L1 acquisition (if there are any) are also expected in early L2 acquisition. Put differently, the initial value for a property of the L2 is predicted to be the initial value for this property in L1 acquisition.

As we will illustrate below, there is clear evidence for a cross-linguistic preference in L1 acquisition with regard to the property under investigation here. Moreover, this preference is different from that in the (adult) L1 of the learners in our study. This constitutes precisely the scenario necessary for obtaining opposite predictions from the two hypotheses under investigation. We will state these exact predictions in section 5, after introducing the crosslinguistic and developmental evidence in sections 3 and 4 respectively.

### 3. The interaction between disjunction and negation across languages

The cross-linguistic variation in the interaction between disjunction and negation has been recently highlighted by Szabolcsi (2002). Let us concentrate on sentences containing disjunction in object position, such as:

- (1) John does not speak English or German

Let us assume that the relevant operators are interpreted as dictated by classical logic. In particular, let us assume that disjunction is interpreted as inclusive disjunction. There are two logical possibilities as to how the relevant operators can be interpreted. First, disjunction can receive narrow scope with respect to negation. Alternatively, disjunction can receive wide scope over negation. The two scope assignments are represented in (2) and (3) respectively.

(2)	P	Q	Not (P or Q)
	1	1	0
	1	0	0
	0	1	0
	0	0	1

(3)	P	Q	(Not P) or (Not Q)
	1	1	0
	1	0	1
	0	1	1
	0	0	1

As it turns out, languages differ as to which scope assignment is assigned to sentences like (1). In particular, speakers of languages like English tend to interpret sentences like (1) according to the scope assignment in (2), whereas speakers of languages like Hungarian and Japanese prefer to interpret sentences like (1) according to the scope assignment represented in (3).

As the truth-tables above suggest, at the level of semantic interpretation, the difference between a language like English and a language like Japanese emerges in contexts that yield different values for the relevant atomic propositions. To illustrate, native speakers of English typically reject sentences like

(1) in contexts in which John speaks only one language among English and German, whereas native speakers of Japanese typically accept the corresponding sentence in the same context.

The difference in how scope is assigned to negation and disjunction across languages also presents a second consequence, which will become most relevant when we consider how this property may be acquired in second language acquisition. Let us focus on the truth-table in (3). As the truth-table suggests, the range of situations in which a native speaker of Japanese is expected to accept a sentence like (1) is quite broad. Upon hearing a sentence like (1), a speaker of Japanese would be able to entertain quite a range of situations. For example, he could assume that in the current world John speaks English, but he does not speak German. Alternatively, he could assume that in the current world John speaks German, but he does not speak English. Finally, the relevant speaker could even assume that in the current world John does not speak either. Research in formal pragmatics has shown that, in similar situations, listeners often draw upon common principles of communication in order to construct an enriched meaning. In particular, it has been proposed that hearers often exclude situations that could be unambiguously conveyed by alternative statements (see Grice, 1975, and Horn, 1989). We can illustrate this reasoning by considering a sentence like (4).

(4) John speaks English or German

Upon hearing (4), a native speaker of English typically constructs a pragmatically enriched interpretation, according to which John speaks English or German, but not both. This results from the computation of a so-called scalar implicature. This enriched interpretation results from the fact that, if the speaker had intended to convey that John speaks both English and German, he would have made use of a more informative statement, namely (5).

(5) John speaks English and German

Having illustrated the standard mechanism of scalar implicatures, we can now go back to (1) and ask whether anything similar would apply. The answer to this question depends on which scope assignment is assigned to (1). In particular, no implicature arises if negation receives widest scope as in (2), but an implicature arises if disjunction receives widest scope, as in (3). The reason for this asymmetry is that an alternative statement containing conjunction (6) only provides an informationally stronger alternative in the second case.

(6) John does not speak English and German

As a consequence, a native speaker of English who hears (1) will not compute any implicature and will interpret (1) as dictated by the truth-table in (2). By contrast, a native speaker of Japanese who hears the equivalent of (1) will consider that if John does not speak either language, a cooperative speaker would have used the equivalent of (6) rather than (1). The result of this reasoning is that, strictly speaking, a native speaker of Japanese will not interpret a sentence like (1) as dictated by the truth table in (3). Rather, a speaker of Japanese will typically construct a pragmatically enriched interpretation that can be represented as in (7).

(7)	P	Q	(Not P) or (Not Q)
	1	1	0
	1	0	1
	0	1	1
	0	0	0

Having summarized the different scope-taking properties of disjunction in adult English and Japanese, we can turn to the predictions for language acquisition.

#### 4. L1 acquisition

The acquisition of the scope properties of disjunction was first considered by Goro and Akiba (2004), a study that draws upon work by Crain et al. (1994). This study by Crain et al. (1994) is concerned with the acquisition of so-called privative ambiguities, i.e., ambiguous sentences where one reading truth-conditionally entails the other (see Horn, 1989). We can refer to the reading that entails the other as the strong reading, and to the reading that is entailed as the weak reading. The question addressed by Crain et al. (1994) is whether children could face any learnability problem in the acquisition of such ambiguities. To address this question, two scenarios need to be considered. Suppose that at some stage of language acquisition a child has learned only the strong interpretation. Plausibly, the child could find evidence for the existence of the weak reading through exposure to an utterance of the sentence in a situation where only the weak reading is true. But now imagine that a child has learned only the weak interpretation of a sentence that is ambiguous in the target language. Since the strong reading entails the weak reading, there cannot be a situation in which only the strong reading is true. So it is unclear how the child's linguistic experience might ever provide evidence for the availability of the strong reading. On this second scenario, the child would indeed be facing a learnability problem. To avoid this problem, according to Crain et al. (1994), the Language Acquisition Device prevents children from positing only a weak reading of a potentially ambiguous sentence. In other words, they propose that in cases where one reading entails the other, the Language Acquisition Device ensures that the strong reading is always learned first. Crain et al. refer to this constraint as the Semantic Subset Principle.

Let us now consider how the Semantic Subset Principle could apply to the acquisition of the scopal properties of disjunction by illustrating Goro and Akiba's (2004) reasoning. As the tables in (2) and (3) make clear, a language like English licenses an interpretation that is true in a subset of the circumstances that make true the interpretation generated by a language like Japanese.<sup>1</sup> Thus, one could conceive the interpretation licensed by English as strong and the interpretation licensed by Japanese as weak. On this view, the Semantic Subset Principle prescribes that children should initially start off with the hypothesis associated with English. If necessary, children exposed to Japanese will then be able to revise their hypothesis on the basis of positive evidence. A prediction of this account is that children exposed to English should behave like adults from the initial stages of language development, whereas children exposed to Japanese should go through an English-like stage. This prediction seems to be supported by experimental data.<sup>2</sup>

The first piece of data concerns the interpretation of sentences containing disjunction and negation in child English (see Crain, Gardner, Gualmini & Rabbin, 2002; Gualmini, 2004; and Gualmini & Crain, 2005). The picture emerging from these studies is that English-speaking children interpret disjunction in the scope of negation from very early on. To illustrate, Gualmini and Crain (2005) tested 4-year-olds' interpretation of sentences like (8).

(8) Winnie the Pooh will not let Eeyore eat the cookie or the cake

The results show that English-speaking children consistently reject a sentence like (8) in a context in which Winnie the Pooh allows Eeyore to eat either the cookie or the cake, thereby interpreting disjunction in the scope of negation.

The second piece of data was provided by Goro and Akiba (2004). These authors tested Japanese speaking children's comprehension of sentences like (9).

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<sup>1</sup> As argued by Gualmini and Schwarz (2007), this reasoning falls apart once we take into consideration scalar implicatures. For the time being, we will put aside this point and we will follow Goro and Akiba's reasoning on the grounds that scalar implicatures are not robustly available to young learners (see Guasti et al., 2005).

<sup>2</sup> The logic behind the Semantic Subset Principle proposed by Crain et al. (1994) has been recently challenged by Gualmini and Schwarz (2007). The critique raised by Gualmini and Schwarz (2007) concerns the claim that children would face a learnability problem if they were to hypothesize a weak reading right off the bat. Gualmini and Schwarz (2007) do not raise any doubts against the claim that, in many cases, children do in fact start off from the strong reading, and this is the point that is relevant to our discussion.

- (9) Butasan-wa ninjin ka piiman-wo tabe-nakat-ta  
 pig-TOP carrot or pepper-ACC eat-neg-Past  
 ‘It’s either the carrot or the pepper that the pig didn’t eat.’

The results documented by Goro and Akiba (2004) reveal a robust difference between Japanese-speaking children and Japanese-speaking adults. In particular, Goro and Akiba (2004) discovered that in a context in which the pig had eaten only the carrot (or only the pepper), Japanese speaking adults would accept (9), whereas children (aged 3;7- 6;3, mean: 5;3) would reject it. Similar results were obtained in a study of these properties in L1 Russian, a language with the same interpretive preferences as Japanese (Verbuk, 2006). One plausible interpretation of the findings is that, at this stage of development, children exposed to Japanese or Russian still have not learned the scopal properties of disjunction in their language and are still drawing upon the initial hypothesis determined by UG, which happens to be the one associated with English.

Let us sum up. We have reviewed the main difference in how disjunction (in object position) interacts with negation in English and Japanese. We also reviewed previous literature on language acquisition. The experimental findings documented in the literature suggest that children initially interpret disjunction inside the scope of negation. For our purposes, the consequence of this finding is that, when it comes to the scopal properties of disjunction, we know what the initial state in L1 acquisition looks like. We can now turn to the relevance of this phenomenon as a case study for alternative views about second language acquisition.

## 5. The L2 experiment

Given the empirical facts discussed above, we are now in a position to formulate the predictions of the two hypotheses at stake with regard to the interpretation of sentences like (1) by Japanese learners of English. Recall that under the Full Transfer hypothesis, learners’ initial assumptions will be based on their L1. Thus the prediction is that Japanese learners of English will begin by interpreting disjunction *outside* the scope of negation, just like in Japanese. In consequence, they are expected to accept (1) as true in a situation where John speaks one of the two languages. Under Full Access without Transfer, on the other hand, we expect L2 learners’ initial preferences to mirror those of early L1 learners. In the case of sentences like (1), we know from the L1 literature discussed above that children’s initial preference is for the interpretation of disjunction *inside* the scope of negation. The same is therefore expected from L2 learners at the initial state. Thus the Full Access without Transfer hypothesis predicts that Japanese learners of English will tend to reject (1) as false in a situation where John speaks one of the two languages. The predictions are summarized in (10).

- (10) Predictions for Japanese learners of English

	<i>interpretation of disjunction</i>	<i>judgment of (1) in a situation where John speaks one language</i>
Full Transfer	outside scope of negation	TRUE
Full Access without Transfer	inside scope of negation	FALSE

### 5.1 Participants

Forty participants were recruited to take part in the study: 32 native Japanese speakers acquiring English as an L2, and 8 native English speakers, who served as controls. The average age of the L2 English speakers was 31;3 years (range 19-56). All L2 speakers were exposed to English for the first time in junior high, at an average age of 12;6 years old. The period of study of English varied widely among participants; however, all L2 speakers had completed at least 6 years of English study, with an average study period of 10;6 years (range 6-21). Native speakers were graduate and undergraduate

students at McGill University in Montreal, who identified English as their first and dominant language. All participants were recruited in Montreal, and were compensated for their participation.

## 5.2 Method and procedure

All participants were first asked to fill out a background questionnaire concerning their education and language background. L2 speakers were then asked to take a cloze test as a proficiency check. Native speakers were exempted from this portion.

All participants were then presented with the main experimental task, a truth value judgment task (Crain & McKee, 1985; Crain & Thornton, 1998), which was adapted from the task used by Goro and Akiba (2004). In contrast to their task, however, ours was presented in writing, rather than being acted out with puppets. The story portion of the task, along with the instructions, were written in both English and Japanese, to ensure that all speakers would understand the nature of the task, along with the background against which the sentences were to be considered. The story was about an eating contest among a group of animals, in which the animals were challenged to eat a cake, a carrot and a pepper. The participant and three other characters, Hello Kitty, Pikachu, and Doraemon, were unable to directly observe the contest. However, each animal got a prize based on what they ate. All animals ate the cake; an animal that also ate both vegetables received a golden crown, while eating only one of the two vegetables won the animal a blue necklace. An animal that ate only the cake received a red clown nose. Based on these prizes, the three characters made guesses as to what each animal ate. Participants were then asked to judge whether or not these guesses were correct, and, if they disagreed, to provide a reason why. Participants were also instructed not to return to pages they had finished, making sure that they did not change their previous answers. The introductory story was followed by two practice pages containing three sentences each, during which the experimenter intervened, if necessary, to ensure that participants understood the task. This was followed by 15 test pages, each consisting of three sentences to be judged. An example of a test page is shown in Figure 1. Learners took approximately 20-30 minutes to complete this task.

Figure 1. Example of test page, containing three sentences to be judged.

	
	<p>“The duck didn’t eat something.”</p> <p><input type="checkbox"/> right <input type="checkbox"/> wrong</p> <p>What did he eat ? _____</p>
	<p>“The duck ate the cake, but he didn’t eat the carrot and he didn’t eat the pepper.”</p> <p><input type="checkbox"/> right <input type="checkbox"/> wrong</p> <p>What did he eat ? _____</p>
	<p>“The duck ate the cake, but he didn’t eat the carrot or the pepper.”</p> <p><input type="checkbox"/> right <input type="checkbox"/> wrong</p> <p>What did he eat ? _____</p>

The experiment contained a total of 45 sentences to be judged. Of these, 10 were of the type corresponding to (1), as shown in (12), the remainder were fillers. (12) was presented five times in the context of an animal wearing a necklace (indicating that it ate one of the two vegetables; condition I) and five times in the context of an animal wearing a clown nose (indicating no vegetable eaten; condition II). A summary of the critical conditions is given in (13).

(12) [The animal] ate the cake, but he didn't eat the carrot or the pepper.

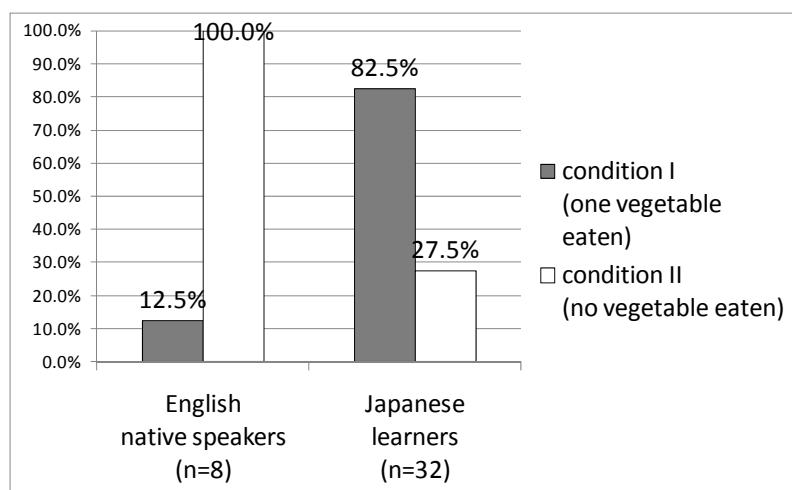
(13) Summary of critical conditions

<i>condition</i>	<i>picture</i>	<i>sentence</i>	<i>judgment in English</i>	<i>judgment in Japanese</i>
I (n=5)	animal with necklace (=one vegetable eaten)	[The animal] ate the cake, but he didn't eat the carrot or the pepper.	FALSE	TRUE
II (n=5)	animal with clown nose (=no vegetable eaten)	[The animal] ate the cake, but he didn't eat the carrot or the pepper.	TRUE	FALSE

### 5.3 Results

Figure 2 presents a summary of responses in the two critical conditions by the two participant groups. As expected, English native speakers accepted (12) in a context where no vegetable had been eaten (condition II) at a rate of 100%. Seven out of eight native speakers consistently rejected the same sentence in contexts where one vegetable had been eaten (condition I), whereas one native speaker, contrary to expectation, consistently accepted it. Thus with the exception of one participant, native speakers performed as expected.

Figure 2. Mean percentages of sentences judged 'true'.

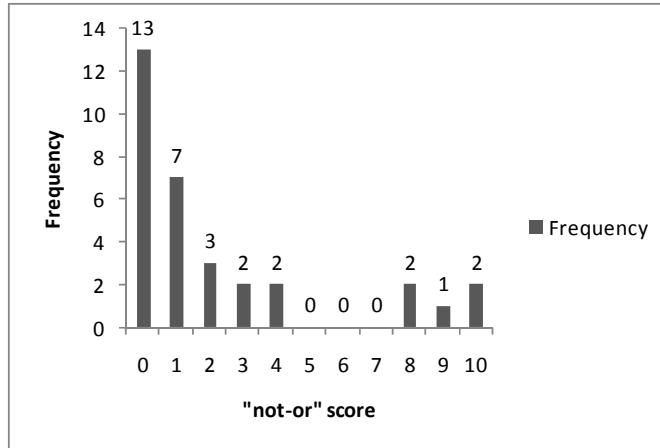


The response pattern found in the L2 group, on the other hand, is precisely the opposite: as a group, Japanese learners of English accepted (12) in a context where one vegetable had been eaten, and rejected it in contexts where none had been eaten. This pattern reflects the acceptability of these sentences in the learners' L1, Japanese (see (7) above), thus presenting evidence of L1 transfer.

Further analysis of results within the L2 group was undertaken to investigate whether there exist individual learners who have acquired the target interpretation of disjunction under negation in

English. For this purpose, we calculated a score for each learner which equals the sum of target/English-like responses in conditions I and II taken together, for a “not-or score” between 0 and 10. Analysis of these scores in the L2 group reveals a bimodal distribution of frequencies, as shown in Figure 3.

Figure 3. Distribution of frequencies for ‘not-or’ scores in the L2 group (n=32).



Five L2 learners obtained a score of 8 or higher, reflecting an English-like interpretation of disjunction under negation. The remaining 27 learners, on the other hand, all obtained scores of 4 or lower, reflecting a Japanese-like interpretation. Thus it appears that of the 32 learners in the L2 group, 5 have successfully acquired the target interpretation, whereas 27 show evidence of transfer from the L1.

In order to investigate whether successful acquisition of this property is related to overall proficiency, the correlation between ‘not-or’ scores and proficiency as measured by the cloze test was calculated. A positive trend, but no significant correlation, was found between the two measures ( $r = .308$ ,  $p > .05$ ), indicating that target-like scope assignment to disjunction under negation in L2 English is not directly dependent on overall proficiency in the L2.

## 6. Discussion and conclusion

Recall the predictions made at the beginning of Section 5, in (10). The Full Transfer hypothesis predicts L2 English speakers with Japanese as their mother tongue should judge (12) to be true when one vegetable is eaten, whereas the Full Access without Transfer model would predict that those L2 speakers should judge (12) to be false in that same situation. Our results strongly support the Full Transfer model, since the vast majority of the L2 speakers are interpreting disjunction outside the scope of negation, as in Japanese. Since the initial interpretation in L1 acquisition crosslinguistically has been shown to be the one found in adult English (Goro & Akiba, 2004; Verbuk, 2006), the interpretation of English as if it were Japanese by these L2 learners presents a clear challenge for the Full Access without Transfer model.

One might object that the models under investigation here are models of the initial state in L2 acquisition, yet the L2 participants in this study can hardly be considered at the initial state, having had exposure to English for six or more years. However, testing learners at the very outset of L2 acquisition is generally not feasible, as they would be unable to fulfill even basic task demands in the L2 (but see Grüter, 2005/6, Grüter & Conradie, 2005). Thus the procedure typically employed in studies investigating the L2 initial state is to test L2 learners at a point in L2 development when they have started producing speech and/or are able to fulfill task demands (see e.g., Schwartz & Sprouse, 1994; Vainikka & Young-Scholten, 1994; Slabakova, 2000). If at that point, or indeed at any later point in development, the L2 grammar shows properties of the L1 grammar that are inconsistent with the L2 grammar, this is taken as evidence for the Full Transfer hypothesis of the initial state. Thus the

fact that the learners in the present study have had several years of exposure to English at the point of testing is not relevant. What is important is that even at this later point in development, we find strong evidence of L1 properties in their L2. This is directly compatible with the Full Transfer hypothesis. The Full Access without Transfer model, on the other hand, has no account for such data. Within such a model, one might still argue that the transfer effects observed in our learners are the result of transfer that occurred at a later point in L2 development. We cannot exclude this possibility. Yet there exists at present no model of L2 development which assumes that L1 transfer only takes place at intermediate stages in L2 development. Under these circumstances, the only principled account of the transfer effects observed in our study is full transfer at the initial state.

Our findings demonstrate that the property under investigation is very difficult for L2 learners to acquire. Twenty-seven out of 32 learners do not interpret disjunction under negation in target-like manner. This raises the question what exactly makes it so difficult for L2 speakers to acquire this property. On the other hand, five learners have achieved the target interpretation, indicating that it is not impossible to acquire. Future research is required to investigate (i) the nature of the evidence required for learners to move away from their L1 interpretation, and (ii) the availability of such evidence in the L2 input.

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